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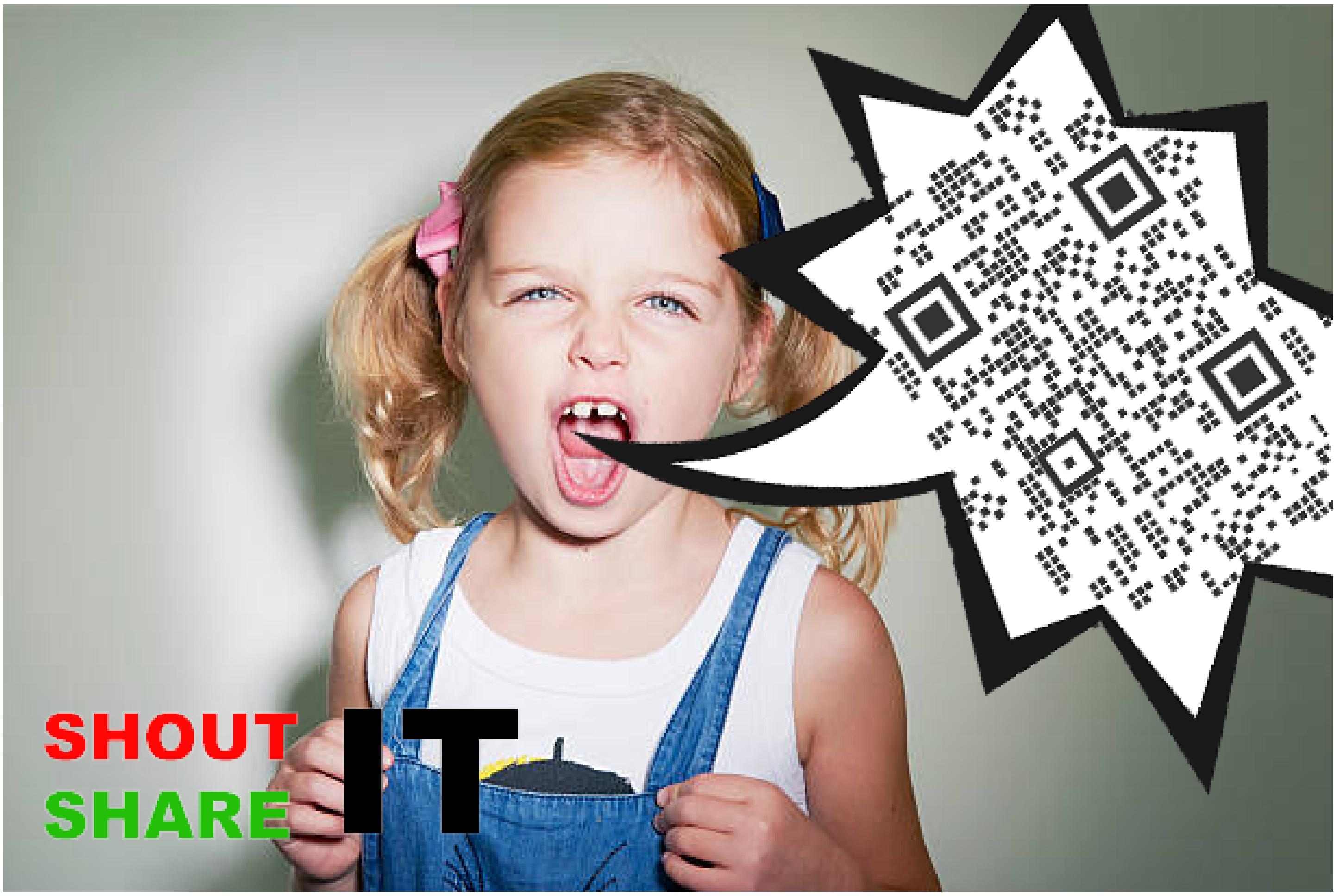
THREE SIXTEENTH-CENTURY MOHAWK IROQUOIS VILLAGE SITES

by Robert E. Funk and Robert D. Kuhn

NEW YORK STATE MUSEUM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THREE SIXTEENTH-CENTURY MOHAWK IROQUOIS VILLAGE SITES

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NEW YORK STATE MUSEUM BULLETIN 503

2003

The University of the State of New York
The State Education Department

© The New York State Education Department, Albany, New York 12230

Published in 2003

Printed in the United States of America

Copies may be ordered from:

Publication Sales
Room 3140 CEC
New York State Museum
Albany, New York 12230
518.402.5344
518 474.2033 (Fax)
www.nysm.nysed.gov/publications.html

Library of Congress Catalog Card Number: 2003105277

ISSN: 0278-3355

ISBN: 1-55557-147-6

Cover illustration: Clay smoking pipe bowl effigy; Smith site, Fulton County, N.Y. (1 ½ actual size).
NYSM Catalog No. A-44757.17
Pencil drawing by Gene E. Mackay, New York State Museum

Bob Funk analyzing Iroquoian ceramics at the Canadian Museum of Civilization, 1992.

Bob Funk beginning excavations at the Klock site, 1969.

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PREFACE

This volume presents final site reports for the Klock, Smith-Pagerie and Garoga sites, three sixteenth-century Mohawk village occupations. These sites were excavated by the New York State Museum, under the direction of Robert E. Funk, between 1960 and 1970. An initial report on the Garoga site was published by Funk in 1973 (Ritchie and Funk 1973:313–332). Many researchers have used and studied the collections and field results from these sites over the years (e.g., Brumbach 1975, 1985, 1995; Chilton 1999; Engelbrecht 1971, 1972, 1974; Kuhn 1985, 1994; Snow 1995; Tuck 1978; Whallon 1968). The numerous research projects and publications based on these sites demonstrate the museum's significant contributions to Iroquois archaeology. But bringing final site reports to completion evolved into a 30-year odyssey.

Bob Funk always said that the primary motivation for the investigations at the three sites came from State Archaeologist William A. Ritchie. In 1957 Ritchie embarked upon a major study of prehistoric settlement patterns which eventually culminated, with collaboration from Bob Funk, in their classic 1973 publication, *Aboriginal Settlement Patterns in the Northeast*. Ritchie's research goals and methods provided the framework adopted by Bob for his explorations in the field. Although Bob worked for Ritchie as a senior scientist, he always was given considerable independence and authority in his choice of field personnel, the management of landowner relations, and his approach to contingencies in the field. Ritchie generously offered his advice and moral support throughout, and Bob credited Bill's contagious enthusiasm for northeast archaeology as the true inspiration for the project. Although I never had the opportunity to meet Ritchie, Bob clearly held him in the highest regard and credited him with significant contributions to the Mohawk Valley work, as well as to Bob's career in general.

Funding, field transportation, and laboratory facilities to support the excavations at Garoga, Klock, and Smith-Pagerie were provided by the New York State Museum, with some support from Ritchie's National Science Foundation Grants Nos. 2598, 22101, and GS 1177. A field school from Harpur College, now the University at Binghamton, SUNY, assisted the museum crew during the excavations at the Garoga site. Field schools from the University at Albany, SUNY, participated in the excavations at the Klock and Smith-Pagerie sites. Cleaning, organizing, and cataloguing the collections from the 1960, 1961, 1962, and 1964 field seasons at the Garoga site were accomplished by Anthropology Curator Charles E. Gillette. Gillette and Beth Wellman, then laboratory technician in anthropology, processed the collections from the 1968 and 1970 seasons at the Smith-Pagerie site and the 1969-1970 seasons at the Klock site.

The field component of the museum's project ended on a discouraging note. Efforts to thwart museum access to sites in the Mohawk Valley on the part of some local artifact collectors ultimately soured Bob's interest in the project. Initially, it was Bob's intention to publish a full report co-authored with Donald Lenig on the terminal prehistoric–early historic phases of Mohawk culture. The report was to include the results of his work at Garoga, Klock, and Smith-Pagerie, and his excavation of a small cemetery at the Rice's Woods site (Ritchie and Funk 1973:324, 327). But, after completion of the Garoga site report and the 1973 settlement-patterns publication, Bob turned his attention to other endeavors, most notably his massive Susquehanna Valley research effort.

The present volume was envisioned as a collaborative effort by the two authors in 1987. In that year, I accepted a job with the New York State Office of Parks, Recreation and Historic Preservation. After spending a number of years excavating sites with Dean Snow on his Mohawk Valley Project, I realized that fieldwork in my new position would be extremely limited. But because my work location was in downtown Albany, I considered that perhaps some opportunities to conduct research on the museum's Mohawk Valley collections might be possible. This idea was greeted with enthusiasm from Bob Funk. We planned a joint publication of site reports on the Klock and Smith-Pagerie sites. I would complete a detailed description and analysis of the artifact collections and Bob would contribute a comprehensive analysis of the settlement patterns.

Much of the artifact descriptions and analysis were completed between 1987 and 1992, before my office was relocated from downtown Albany to Peebles Island. But Bob's own office obligations and the Susquehanna project rightly remained his top priorities during this period. Bob's contributions were limited to good advice, suggestions, and enthusiastic encouragement during this time, and he did not begin to work in earnest on the project until after his retirement and the publication of his Susquehanna tomes (1993, 1998). In addition, our work on the Klock and Smith-Pagerie sites led us to occasional research digressions (Kuhn 1996; Kuhn and Funk 1994, 2000; Kuhn, Funk, and Pendergast 1993) that also delayed the final volume. But once Bob turned his full-time attention back to his Mohawk work, the settlement pattern analysis and the volume in general quickly took shape. Yet Bob's research eventually led him to a thoughtful reconsideration of his earlier Garoga site settlement pattern interpretations, and a decision was made to expand the volume to include these revisions. In hindsight this decision seems obvious, because the three sites are closely related and were all excavated under Bob's leadership.

By this time, our respective situations were largely reversed. In retirement, and with the Susquehanna project behind him, Bob had much time and energy to devote to the project. But, considering significant career and family obligations of my own, my role was often limited to advice, suggestions, and enthusiastic encouragement. I was able to write and to help with revisions to the text. But Bob took on the task of assembling maps, photos, and figures for the volume and handling all arrangements with the New York State Museum for publication.

The monograph went out for peer review and we received positive responses in January and March 2002. Over the summer Bob and I spent many hours together working on final revisions suggested by the reviewers. This was an exciting time for us, because we knew we were putting the finishing touches on the volume and would soon see it in print. Considering that Bob had wanted to publish this material for more than 30 years, and I had been involved for the past 15, we were both enthusiastic about completing the job. Comments by one of the reviewers suggested to us that the volume could benefit from a more in-depth analysis of chronological trends in ceramics. I was assigned this task, and by late September it was the only remaining task to be completed before the volume would be ready for publication.

We were all shocked when Bob passed away suddenly on September 25, 2002. I had seen Bob the week before when I dropped off some final manuscript revisions. At the age of 70, Bob was still as vigorous and vital as always. We talked about final details for the publication and kicked around ideas for cover designs. The project was so close to fruition, it never occurred to me that Bob would not get to see it completed.

I have noted above that Bob credited Bill Ritchie with motivating him to take on the Mohawk project. My own inspiration for completing this volume comes from Bob. Bob was not just an incomparable archaeologist; he was also a terrific fellow. Bob was always enthusiastic about archaeology, always willing to engage in discussion, always willing to share his research and data with others, and always willing to be a friend. A project of this size and scope, so long delayed, might easily have been set aside. But, even after long periods of inactivity because of other more pressing responsibilities, Bob's infectious enthusiasm always brought me back to work on the volume. I cannot credit Bob with establishing my initial interest in Mohawk archaeology. My two principal mentors, Dean Snow and Bill Starna, are wholly responsible for that. But Bob's ongoing collaboration and his encouragement, support, and interest in my work are in no small part responsible for inspiring much of my on-going research in the field. After Bob's death, I made a commitment to see this volume finished as a way to honor him. I wanted to honor his leadership, scholarship, and important contributions to the field of Iroquois archaeology, and also to recognize the friendship and camaraderie that I remember most about him.

I completed the charts illustrating chronological trends in Mohawk pottery attributes the night before Bob passed away. I was looking forward to showing them to Bob and discussing my interpretations. But he never got to see them. In general, our volume represents a true collaboration. We traded ideas and talked about major issues extensively. The monograph represents our shared interpretation of these three sites and Mohawk archaeology in general; instances where we had differing interpretations are noted in the text. The only exception to this is the chronological analysis of the ceramics, which was completed too late for Bob's input. Any shortcomings in this portion of the work are fully my own. I do express my appreciation to Bill Engelbrecht for his willingness to share his ceramic attribute data from Mohawk sites for use in this analysis and my appreciation to Nancy Herter for her review and constructive comments on the pottery analysis. I feel confident that Bob would also have approved of the results!

Bob felt indebted to the landowners (Mr. and Mrs. W. Sanderson, M. Saltsman, P. Ewart, C. Start, Mr. and Mrs. R. Maund, and M. Pagerie) who permitted access to the three sites, and to the museum crews, university students, and other archaeologists who participated in the excavations. Thirty years after the fact, a complete list of every person who worked on these sites is not available. But a partial list includes: T. Altman, N. Barka, S. Baugher, A. Blaise, L. Blakemore, J. Bouchard, G. Buchner, S. Carroll, K. Carlson, G. Cook, D. Corbyn, R. Corbyn, L. Denison, K. Fisher, J. Fox, B. Fullem, R. Gramly, D. Hawley, M. Houck, R. Houck, R. Johnson, W. Johnson, S. Laks, P. Lord, M. Martin, I. Mattson, K. McGill, E. Messer, P. Miller, H. Mittleman, J. Mori, J. Moss, J. Muller, B. Nadler, J. Nathan, C. Neal, D. Onion, H. Schroeder, F. Shambach, M. Shapiro, N. Trubowitz, M. Webster, B. Wellman, J. Weeks, N. Whitney, T. Whitney, F. Wilding-White, J. Wilson, and R. Wyatt. It is interesting to note that a significant number of these people went on to work professionally in archaeology for most or all of their careers. This appears to me to be another testament to Bob. He was a great person to work for, a great person to dig with, and an archaeologist who loved his chosen profession and inspired others to love it too.

We are also indebted to the two peer reviewers, James Bradley and Wayne Lenig, for the thorough treatment they gave to our final draft. Jim was a great champion of the cause and his unqualified encouragement motivated us to accelerate work on the publication. Wayne's exhaustive and detailed critique and his willingness to share his encyclopedic knowledge of Mohawk archaeology led to the correction of many minor errors in the text. His thoughtful commentary on a number of larger issues led us to reconsider some positions and also to add substantially to our presentation on ceramics and chronology. Because Bob had originally planned to develop this monograph in collaboration with Don Lenig, Wayne's contributions seem especially apropos. The assistance of these two authorities has greatly improved the report.

Both of us are indebted to Lisa Anderson, Penelope Drooker, John Hart, and Beth Wellman of the Anthropological Survey, New York State Museum, all of whom facilitated our access to the artifact collections, field notes, and maps pertaining to the sites. John Skiba, chief of Cartographic Services, offered valuable advice during the period of production of maps, charts, and photographs. After Bob's passing, the museum staff was extremely supportive and helpful to me. Their efforts are a reflection of how they felt about Bob. I also wish to thank the Funk family, especially Alfred Funk and Latisha Azweem, for their support, assistance, and desire to see the volume published. The publication would not have been completed without their encouragement and active participation.

We are also grateful for the high quality of the maps, charts, and profiles prepared for this report by artists Linda Anderson and Roberta Wilson, Thaddeus Beblowski for scanning and modifying the large site plans, and for the artifact illustrations drawn by Gene MacKay and Patricia Miller. We also wish to express our appreciation to Joe McEvoy, New York State Office of Parks, Recreation, and Historic Preservation, for identifying historic ceramics from the sites. Bonnie Dingmon, also of Parks and Recreation, deserves recognition for the tedious task of proofreading the text and checking all references.

Robert D. Kuhn
Delmar, New York
Fall 2002

CHAPTER 1

INTRODUCTION

This monograph presents the final site reports on three important villages of the Mohawk tribe, the easternmost of the five historically known tribes that comprised the famed League of the Iroquois (Fenton and Tooker 1978). The Mohawk occupied the area between the modern village of Little Falls, in the western Mohawk Valley, and the city of Amsterdam in the eastern valley. This tribal territory was approximately 40 miles wide from east to west and 20 miles wide from north to south (Figure 1). Decades of investigation by historians, ethnologists, and archaeologists have described the Mohawk in terms of their history, culture, origins, demography, relations with other native groups, the role they played in the interaction between European colonial powers in the seventeenth and eighteenth centuries, and their subsequent history within the modern-day United States and adjoining Canada.

Since their excavation in 1968 to 1970, two of the sites described here, Smith-Pagerie and Klock, have been only partially reported in previous publications (Ritchie and Funk 1973:170, 331, 363, 367; Snow 1995:165–180). The major task of analyzing and characterizing the many thousands of potsherds from the sites was accomplished by Kuhn and Bamann (1987). Specialized analyses of shell artifacts (Kuhn and Funk 1994), projectile points (Kuhn 1996), faunal remains (Kuhn and Funk 2000), and exotic artifacts (Kuhn, Funk, and Pendergast 1993) have been reported for these sites in a series of synthetic articles on the Mohawk. Funk has completed a very detailed study of the settlement data, resulting in revised interpretations of the house patterns, features, and other occupational remains.

Smith-Pagerie and Klock are located in the Caroga Creek drainage west of Johnstown, New York. They are near a third large village, the Garoga site, also located in the Caroga Creek basin (Figure 1). Occupations at these sites were all close in time, from the early to late sixteenth century, and are usually assumed to represent successive moves of one local population. Ritchie (1965) and Ritchie and Funk (1973) assigned all three sites to the Garoga *phase* of Mohawk cultural development. We should note that Ritchie also used the terms *Oak Hill phase* and *Chance phase* for earlier stages of Iroquoian development; this is in some contradiction to Donald Lenig's definition of Oak Hill and Chance as *ceramic horizons* (Lenig 1965; personal communication to Funk ca. 1969). Neither Lenig nor Ritchie used *Garoga* as a ceramic horizon, but the present writers prefer just that usage.

Apart from the studies listed above and reported here, the ceramic collections from these sites have been used in analyses concerned with the typology and chronology of Iroquois pottery, the evolution of Iroquoian sociopolitical organization, the formation of Iroquoian tribes, the rise of the League of the Iroquois, the delineation of ethnic boundaries, and the technological attributes of vessels in relation to maize horticulture (Brumbach 1975, 1985, 1995; Chilton 1999; Engelbrecht 1972, 1974; MacNeish 1952; Whallon 1968).

All three sites were excavated under Funk's field direction as part of the settlement pattern project undertaken by former State Archaeologist William A. Ritchie, following his contribution to a multiauthor volume on the subject (Ritchie 1956). Only the Garoga site was reported in detail in the settlement pattern synthesis by Ritchie and Funk (1973), but a review of the data indicated that some reinterpretations were in order. Therefore a new look at Garoga forms a major part of this report.

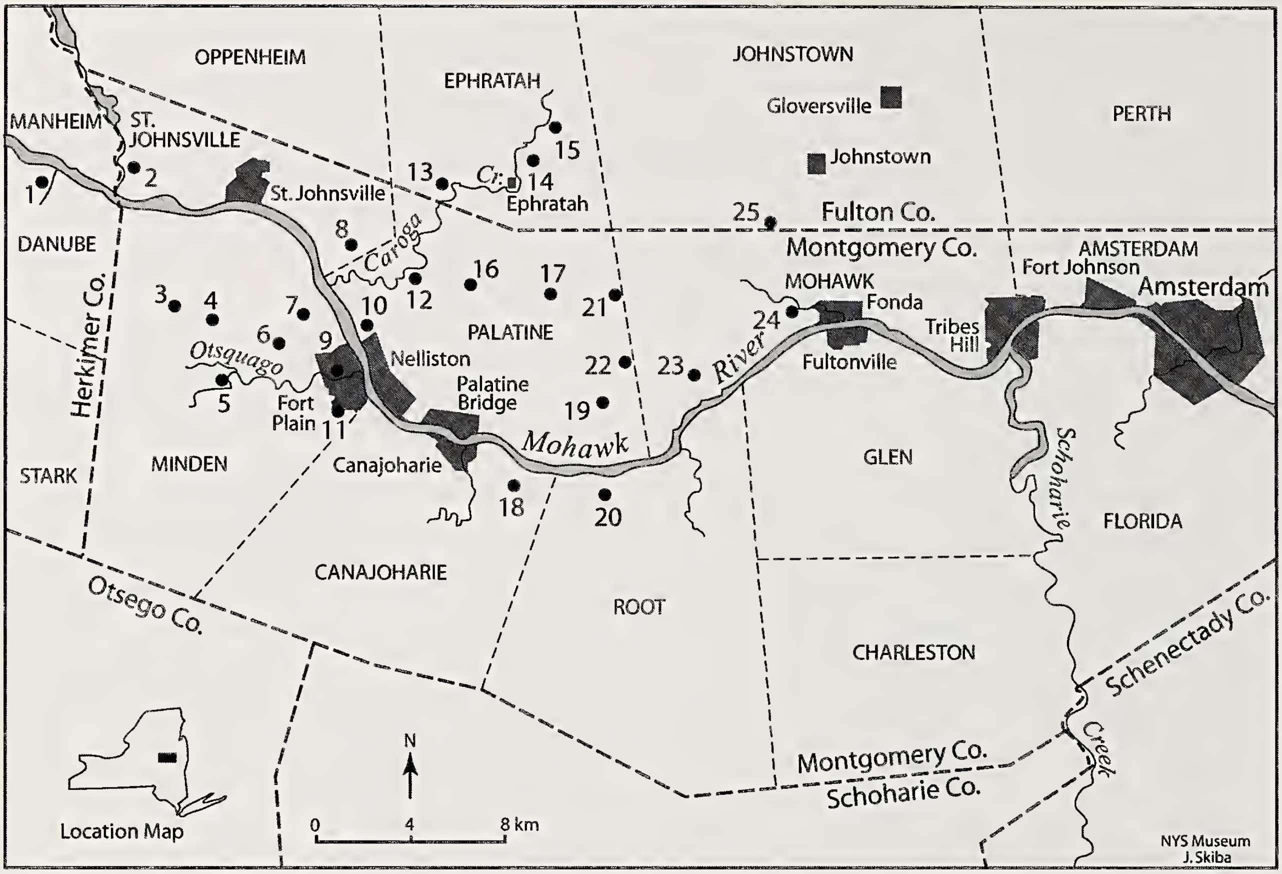
OPPENHEIM
EPHRATAH
JOHNSTOWN
PERTH
Gloversville
Johnstown
MANHEIM
ST. JOHNSVILLE
St. Johnsville
Ephratah
Cr.
Caroga
Fulton Co.
Montgomery Co.
DANUBE
Herkimer Co.
AMSTERDAM
Fort Johnson
Amsterdam
MOHAWK
Fonda
Tribes Hill
Fultonville
PALATINE
Nelliston
Palatine Bridge
Otsquago
Fort Plain
Mohawk
River
STARK
MINDEN
Canajoharie
GLEN
Schoharie
FLORIDA
CANAJOHARIE
ROOT
Otsego Co.
CHARLESTON
Schenectady Co.
Creek
Montgomery Co.
Schoharie Co.
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Figure 1. Map of the Middle Mohawk Valley, showing some of the archaeological sites of the Mohawk Iroquois mentioned in the text. Locations are confined to sites in Fulton and Montgomery Counties, New York. Key: 1, Indian Castle; 2, Ganada No. 2; 3, Elwood; 4, Fox Lair; 5, Otstungo; 6, Second Woods; 7, Oak Hill No. 1; 8, Jackson-Everson; 9, Galligan; 10, Wormuth; 11, Swart-Farley; 12, Wagner's Hollow; 13, Klock; 14, Garoga; 15, Smith-Pagerie; 16, Kilts; 17, Getman No. 1; 18, Horatio Nellis; 19, Rice's Woods; 20, Rumrill-Naylor; 21, England's Woods; 22, Coleman-Van Duesen; 23, Briggs Run; 24, Caughnawaga; 25, Cayadutta. Modified from Snow (1995:Figures 1.1, 1.2).7

THEORETICAL CONSIDERATIONS AND GOALS OF THE INVESTIGATIONS

The classic and perhaps most often used definition of *settlement pattern* was offered some time ago by Willey (1953:1):

> The term 'settlement patterns' is defined here as the way in which man disposed himself over the landscape on which he lived. It refers to dwellings, to their arrangement, and to the nature and disposition of other buildings pertaining to community life. These settlements reflect the natural environment, the level of technology on which the builders operated, and various institutions of social interaction and control which the culture maintained. Because settlement patterns are, to a large extent, directly shaped by widely held cultural needs, they offer a strategic starting point for the functional interpretation of archaeological cultures.

The settlement pattern is regarded as distinct from community pattern, because settlement pattern is the archaeological manifestation of the extinct community that created it. Looked at from a regional perspective, the settlement system is distinct from the settlement pattern, meaning that the settlements of a particular group, spread over the landscape and displaying diverse characteristics were integral parts of a cultural system interacting with its environment.

Identifying settlements of a particular group in the archaeological record requires the isolation of components of that group, on a site-by-site basis. The component is defined as the totality of traits of a single occupation by a single community or social group, inferred from the material remains at a site or level within a site. Delineating settlement pattern on a regional scale requires tying together the various components represented on sites by analysis of similarities and differences in artifacts, house types, burial customs, village organization, and other traits that define the archaeological phase under study.

For the Caroga Creek cluster of Mohawk villages, we will be considering three levels of settlement analysis. At the level of microstructure is the individual feature, house, or stockade; the level of mesostructure is the overall village plan; and macrostructure is the arrangement of closely related villages and subordinate sites on the middle Mohawk Valley landscape.

Scholarly attention is usually focused on major villages of Iroquoian peoples with little recognition that other settlement types existed. For example, small agricultural hamlets or single houses are known to have occurred close to the Mohawk River, and there is considerable evidence for fishing camps strategically located at stream junctions and at major riffles on the river. Other site types are known to exist, but are vastly underreported (Lenig 1998). This situation can be remedied only by additional large-scale, systematic surveys of the study area.

It is also important to remember that even large village sites containing major components of a particular ethnic group or archaeological entity may have sustained occupations, however short and limited, by other groups; in other words, they may strictly speaking be multicomponent sites. Therefore archaeologists have to be alert to the possibility that some artifacts, refuse remains, and even structures are older (or younger) than the major component. In some cases one ethnic group may have occupied the same site on more than one occasion (see, e.g., the report on two overlapping villages at the Kelso site in Ritchie and Funk 1973:253–275). Nevertheless, during the sixteenth century the isolated back-country locations of many sites generally lacked evidence of previous occupations. Therefore the sites could be considered largely or even entirely single component.

Our study is not intended as a comprehensive survey of Mohawk or general Iroquoian prehistory, because the principal goal is presentation of the long-delayed Klock and Smith-Pagerie site reports and reevaluation of the Garoga site. The original research goals were to acquire data that would contribute to the understanding of Mohawk settlement and subsistence patterns. This required Ritchie and Funk to use a field approach permitting maximum exposure of the village sites, given the time and resources available. In addition to the standard approach to the collection of artifacts, the features, post molds, and structural patterns at these sites were mapped in detail.

It was important to be alert for possible surprises in the form of unusual architectural variation, unfamiliar feature types, possible religio-ceremonial evidence, and so on. Assumptions ultimately derived from ethnographic data concerning structural and household patterns, social organization, subsistence and ceremonialism need to be kept open for reexamination. Ground truth at particular sites need not conform to expectations derived from prior investigations at other sites. Much remains to be learned about the cultural history and adaptive variation in eastern Iroquoia.

HISTORY AND METHODS OF ARCHAEOLOGICAL INVESTIGATIONS

The excavation of Mohawk longhouses is a product of modern archaeology, stemming from the influence of settlement pattern research in the 1950s. Late nineteenth- and early twentieth-century archaeologists largely focused on collecting artifacts and using material culture for building chronologies. Some archaeologists working on Mohawk sites noted evidence of obvious settlement pattern remains. For example, in the 1930s Vincent Schaefer recorded four longhouses at the England's Woods site based on the distribution of surface artifacts and midden soils (Snow 1995:211). He also noted the probable location of the stockade at the Cayadutta site. In 1950 Ritchie excavated a single row of post molds, a probable longhouse wall, at the Deowongo Island site (Ritchie 1952:9), and in 1960 Fort Plain Restoration, Inc., exposed a similar post-mold line at the Galligan site (Lenig 1965:33). Nevertheless, excavations undertaken with the primary goal of exposing and mapping Mohawk settlement patterns were not common.

The first major project designed to expose the settlement pattern of a Mohawk village site was directed by Father Thomas Grassman under the auspices of the Mohawk-Caughnawaga Museum, in Fonda, New York. Beginning in 1950 and continuing intermittently through 1956, Grassman stripped the entire Caughnawaga village site and exposed, recorded and marked the post-mold patterns for 12 longhouses and the surrounding palisade (Grassman 1969:638–647). Despite major settlement pattern excavations at other sites over the years, Caughnawaga remains the only Mohawk village site that has been fully exposed and mapped.

Influenced by the success of Grassman's work, as well as by the growing interest in settlement pattern investigations within the discipline, William A. Ritchie and Robert E. Funk embarked upon a major program of settlement pattern excavations in the Mohawk Valley and other areas of New York State on behalf of the New York State Museum. In 1957 Ritchie directed excavations at the Getman site. From 1960 to 1962, and again in 1964, Funk worked extensively at the Garoga site. In 1965 and 1966 Ritchie dug at Nahrwold No. 1, and between 1968 and 1970 Funk directed extensive work at the Klock and Smith-Pagerie sites (Ritchie and Funk 1973).

The museum employed wide area stripping to expose and record longhouses at each site with feature excavations to recover a representative artifact assemblage. In addition, selective trenching to expose and connect post-mold lines of other longhouses and village palisades was conducted to record the settlement pattern.

Employing this field methodology provided results that could be used to address both "the character of the individual dwelling unit and the spatial arrangement of these units in a community plan" (Ritchie and Funk 1973:2). The work of the New York State Museum has produced the largest corpus of data on Mohawk longhouse patterns with more than 40 house patterns either partially or fully recorded.

Building on the results of previous investigations, the University at Albany Mohawk Valley Project conducted archaeological excavations on numerous Mohawk sites between 1982 and 1991. Initially in collaboration with William A. Starna, and later under the sole direction of Dean R. Snow, the project conducted limited testing and/or excavations on more than a dozen Mohawk sites. The most intensive excavations were completed by summer field schools working on the Elwood, Jackson-Everson, Oak Hill No. 1, Rumrill-Naylor, Indian Castle, Otstungo, Cayadutta, Second Woods, and Fox Lair sites (Snow 1995).

The field methods employed by the Mohawk Valley Project were guided by research goals focusing on Mohawk demography. At most sites excavation attempted to define accurate site size, the intensity of occupation within site boundaries, and the recovery of organic remains suitable for absolute site dating. Eschewing the use of heavy equipment employed by earlier investigators for stripping sites, the Mohawk Valley Project explored the use of new techniques including magnetometer survey, aerial photography, and soil conductance measurements to gather settlement pattern data by nonintrusive means. The limitations of time and resources, and the desire to recover extensive settlement pattern information without the large-scale excavation of sites, contributed to the selection of the field methods employed. The results of the project have produced an improved understanding of Mohawk demographic change over time (Snow 1995).

Despite the emphasis on regional demographics and the limitations of hand excavation, the work of the Mohawk Valley Project did produce information on longhouses at a number of sites. Field work conducted in 1982 at the Elwood site included the complete exposure of a single longhouse. In 1984 one complete and one partial longhouse were excavated at the Rumrill-Naylor site. Between 1985 and 1987 a complete longhouse was excavated at the Otstungo site, and the locations of at least seven other houses were verified and mapped using magnetometer survey. These results filled in some gaps for periods where longhouse data was completely lacking and provided new comparative data for other phases of the Mohawk sequence (Snow 1995).

A variety of techniques have been employed to record longhouse patterns on Mohawk sites. Many of these sites are located in agricultural areas of the Mohawk Valley and are occasionally exposed, and at the same time disturbed, by plowing. On some occasions, surface survey can successfully identify longhouses in plowed fields based upon the density of artifact distributions as well as the color of the exposed soil. Accumulation of organic matter in high concentrations can have a dramatic influence on soil properties, particularly color. For example, Lenig mapped eight longhouses at the Wagner's Hollow site, despite its long history of plowing, based upon the dark "midden soils" representing refuse that had lain on the house floors (Snow 1995:271). The validity of this approach even on cultivated fields was verified at the Getman site where Lenig's (1955) identification of longhouses based on surface soil color was confirmed by Ritchie's subsequent excavation and identification of longhouse post-mold patterns (Ritchie and Funk 1973:291–312). In 1967 Funk observed several longhouse locations on the Van Duesen site that were evident as large, dark stains in a plowed field after a rainstorm, but these houses were not excavated because the landowner withdrew permission at the last moment. Unfortunately surface observation based on soil color and artifact distributions may provide only a very general indication of longhouse location, orientation, and size.

The most common technique for investigating the archaeological remains of longhouses is by exposing post-mold patterns either by mechanical stripping or hand excavation. Post molds are the filled voids in the ground created by past structural elements long since removed, burned, or rotted away. Usually circular on the exposed surface and tapering or conical in cross-section, they are often only recognizable through careful identification of differences in soil color and texture defining the outline of the mold. Nevertheless, these ephemeral features are often the only direct evidence of the structures that once stood on the site.

Patterns of post molds can be used to identify the walls of longhouses as well as interior supports, bed lines, and other structural elements. This evidence can yield fairly precise measurements of the dimensions of the building and its internal configuration. Locations of major support elements can often be discerned based upon the relative sizes of the molds. Changes to the structure or additions made over time can be recognized. As a result, techniques designed to expose and record post-mold patterns have always been the method of choice for longhouse investigations. Twenty-one complete longhouses on Mohawk sites and numerous partial structures have been investigated using these techniques.

Magnetometry, a relatively new technique used by the Mohawk Valley Project, has proven to be useful for site investigations in some instances. Under certain conditions a magnetometer can locate fired clay features, such as hearths, because they create a subtle distortion in the magnetic field. Comprehensive survey of a site taking magnetometer readings at regular intervals can be used to produce a shaded contour plot depicting magnetic anomalies. These anomalies can then be tested in the field using soil auguring to verify the presence or absence of hearths. Because longhouses were typified by fire hearths located along the central aisle, identification of a linear pattern of hearths often indicates the presence of a longhouse.

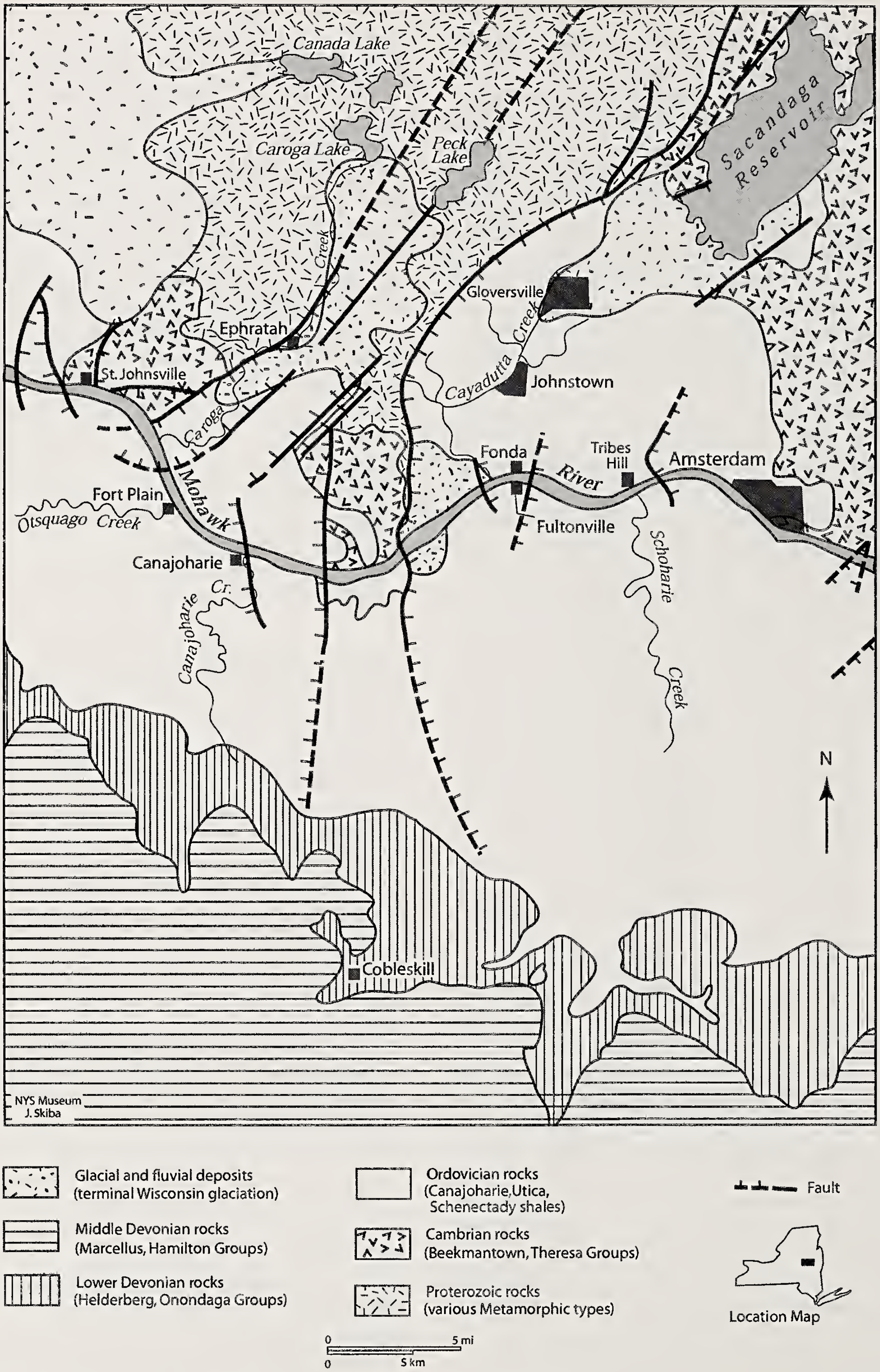
Magnetometer surveys contributed to the investigations at the Rumrill-Naylor site and the Horatio Nellis site, and the technique made an extremely important contribution to the University at Albany's investigations at the Otstungo site. In addition to locating features that guided the excavation of one complete longhouse at the site, a comprehensive magnetometer survey identified seven or eight other linear patterns of features representing probable longhouses. In this way the technique was used to gain a partial understanding of the settlement pattern at the site with little invasive activity (Snow 1995:118–121).

The most successful investigations have employed all of the available techniques in a manner that best fit the specific conditions at a site. At Otstungo for example, the location of House 1 was first identified by the presence of rich midden soil on the surface and subsequently confirmed by magnetometer identification of hearths. In this way the exact location of the house was largely defined before a trowel was ever put in the ground. This served to focus the time-consuming task of exposing post-mold patterns by hand excavation and made those efforts far more productive. As another example, at the Fox Lair site a tightly controlled and mapped surface artifact survey combined with magnetometer identification of hearths proved the most effective approach to identifying probable house areas at a site where post molds were rarely encountered (Bamann 1993:82–96).

THE ENVIRONMENTAL SETTING IN THE MIDDLE MOHAWK VALLEY

The Garoga, Klock, and Smith-Pagerie sites are all located in Ephratah Township, Fulton County, New York, within the Hudson-Mohawk Lowland physiographic province. They are situated on high, easily defended ridges in the drainage of Caroga Creek, a major tributary of the Mohawk River. The source of the creek is Caroga Lake in the foothills of the Adirondack Mountains, approximately 13 miles from the confluence with the river.

The general area is characterized by a broad, rolling topography broken by high hills and small dendritic streams, with increasingly greater relief toward the north. Today it is a mixed landscape of farms, pasturage, and woodland in a typical rural setting. The region's wooded tracts can be generally described as Northern Hardwoods (Braun 1950) dominated by birch, beech, maple, and hemlock. The diverse terrestrial fauna of the region comprise white-tailed deer, black bear, raccoon, woodchuck, gray fox, beaver, river otter, turkey, grouse, Canada goose (in season), and many other mammal and bird species. Fish, including sucker, perch, and catfish, and fresh-water mussels were once abundant in local streams. Mast foods were available from the numerous oak, beech, hazel, and hickory trees of the region. These and other resources were regularly exploited by the Mohawk people, as shown by the often volu-


Canada Lake
Caroga Lake
Peck Lake
Sacandaga Reservoir
Creek
Gloversville
Ephratah
St. Johnsville
Cayadutta Creek
Johnstown
Caroga
Fonda
Tribes Hill
Amsterdam
River
Mohawk
Fort Plain
Otsquago Creek
Fultonville
Canajoharie
Cr.
Canajoharie
Schoharie
Creek
N
Cobleskill
NYS Museum
J. Skiba
Glacial and fluvial deposits (terminal Wisconsin glaciation)
Middle Devonian rocks (Marcellus, Hamilton Groups)
Lower Devonian rocks (Helderberg, Onondaga Groups)
Ordovician rocks (Canajoharie, Utica, Schenectady shales)
Cambrian rocks (Beekmantown, Theresa Groups)
Proterozoic rocks (various Metamorphic types)
Fault
Location Map
0
5 mi
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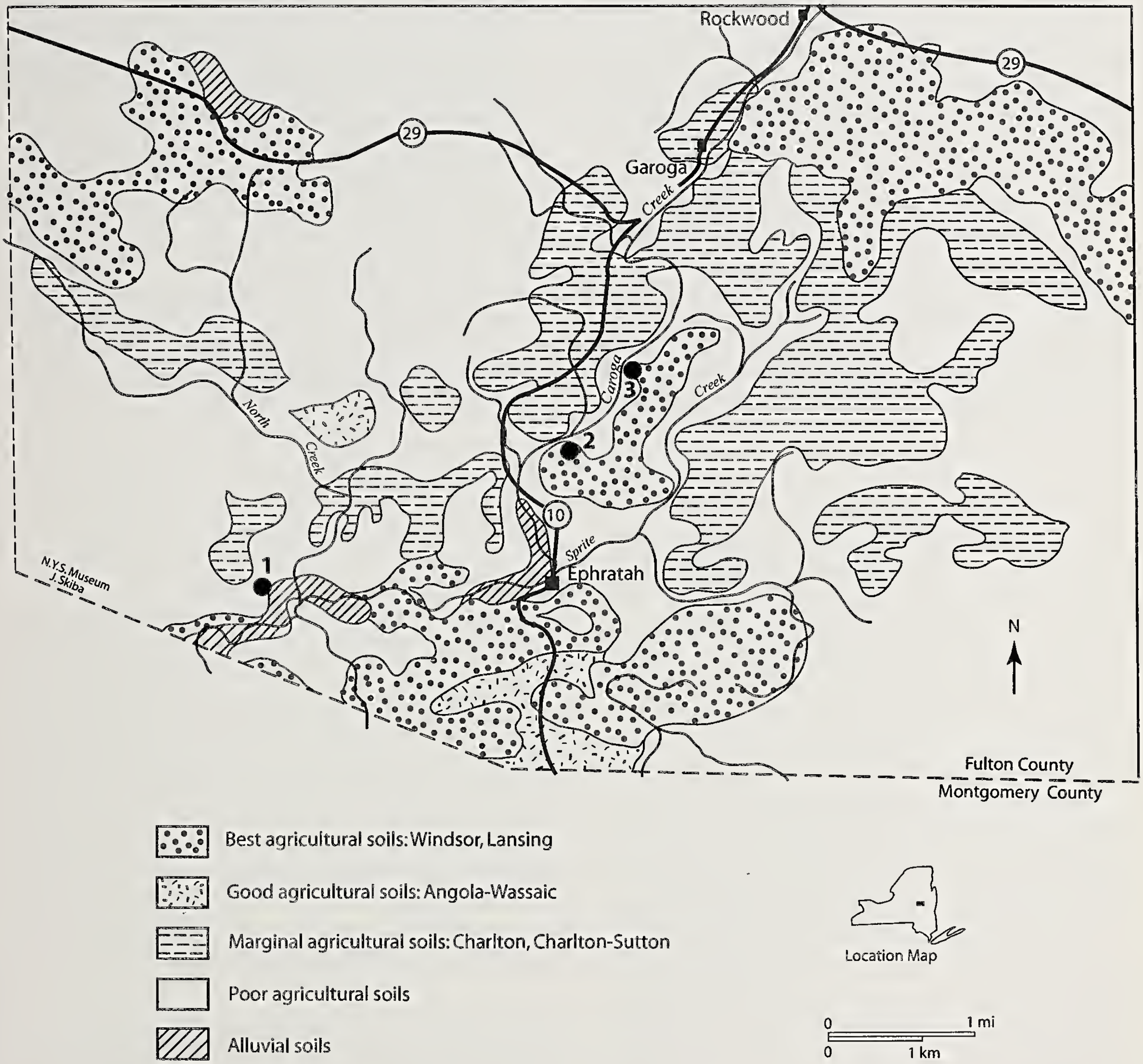
5 km

Figure 2. Bedrock map of the middle Mohawk Valley. Bedrock types are shown grouped together according to major periods in the Precambrian and Paleozoic Eras. Important fault lines are shown. After Broughton et al. (1962).

minous remains found in middens and refuse pits on their village sites (Kuhn and Funk 2000).

The geology of this region played a significant role in determining site locations (Figure 2). The bedrock flooring the basin of the main river channel is almost entirely of Middle to Late Ordovician age and was deposited 440 to 435 million years ago. These formations abut the very ancient Precambrian and Cambrian metasedimentary and metavolcanic substratum of the Adirondack Province to the north and west (Broughton et al. 1976). To the south, the valley is bordered by strata of Lower to Middle Devonian age. Deposits of later Mesozoic and Cenozoic eras are not recorded for the Mohawk Valley; if sediments of these periods were laid down, they were completely erased by later erosion (Fisher 1980). Extensive faulting since the Paleozoic has moved large blocks both horizontally and vertically.


Rockwood
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29
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Creek
Caroga
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North
Creek
1
10
Sprite
Ephratah
N.Y.S. Museum
J. Skiba
N
Fulton County
Montgomery County
Best agricultural soils: Windsor, Lansing
Good agricultural soils: Angola-Wassaic
Marginal agricultural soils: Charlton, Charlton-Sutton
Poor agricultural soils
Alluvial soils
Location Map
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Figure 3. Distribution of soil types in the vicinity of the Klock, Garoga, and Smith-Pagerie sites. Soils are ranked by suitability for agriculture, including depth of topsoil. The most suitable soils are provided by the Windsor and Lansing associations, followed by the Angola-Wassaic association. Marginal, because stony or clayey, are the Charlton and Charlton-Sutton associations. All other soils in the area are considered less suitable or not suitable. Soil map modified from U.S. Department of Agriculture, Soil Conservation Service (Davis, Krawiecki, and Work 1971).

The bedrock underlying the area of the three sites described here is complex and partly obscured by thick glaciofluvial deposits. Bedrock directly beneath the Klock, Garoga, and Smith-Pagerie sites consists of the Middle Ordovician Canajoharie shale but closely adjoining formations are metamorphics of Middle Proterozoic age.

The processes of erosion, glacial infilling, and subsequent postglacial dissection and alluviation have created the tributary system that exists in the Mohawk Valley today. The ancient down-cutting streambed of Caroga Creek formed in preglacial time and is similar to a number of others that dissect the valley (Starna 1976:65–66). These drainage systems carried massive amounts of water down the valley floor. Over tens of thousands of years, these streams deeply incised the soft underlying sedimentary bedrock creating narrow and deep gorges or "hollows" (Brigham 1929). The highly developed series of meanders that characterized these tributaries created numerous isolated oxbows and ridges protected on three sides by stream-cut cliffs and embankments. Thousands of years after retreat of the Wisconsinan ice, which took place around 12,000 years ago, these elevated and isolated locations were sought after by the Mohawk Iroquois for the natural defenses they provided.

The Mohawk obtained most of the resources needed for their houses, tools, and weapons from the local environment. The rocks of their immediate territory produced some useful cherts for weapon points, knives, and other chipped stone artifacts, including Knauderack chert, occurring in the Little Falls dolomite near Palatine Bridge, and the Oriskany chert, occurring in limited amounts in the Oriskany sandstone. The most abundant and highest quality cherts were available several miles south of the main Mohawk Valley along the Onondaga escarpment, where the varieties of chert included eastern Onondaga, Kalkberg, and Esopus types of Lower Devonian age. These types tend to predominate in lithic assemblages of all periods in the valley.

The soils of the region are diverse and of varying suitability for native agriculture. They are chiefly based on glacial deposits from the close of the Wisconsinan glaciation, containing varying proportions of silt, sand, gravel, cobbles, and boulders on which vegetation commenced growing with the onset of Holocene regimes of temperature and rainfall (Davis and Landry 1978; Figure 3).

CHAPTER 2

THE KLOCK SITE[1]

LOCATION AND SETTING

The Klock site is located in Ephratah Township, Fulton County, New York (18 E534870 N4761160), approximately 1.25 miles west of the small hamlet of Ephratah. The site occupies a high ridge overlooking Caroga Creek, which as previously stated is one of the principal tributaries of the Mohawk River (Figure 1). The ridge is at an elevation of 750 feet and slopes slightly to the southeast along its major axis; it then descends precipitously down to Caroga Creek, a 120-foot drop. The northeast and southwest slopes are moderately high and steep. The only easy access to the site is gained from the northwest, where the ridge merges into a large hill. The occupation on this ridge, confined to the area southeast of the old Klock farmhouse, covered an area of approximately 4 acres.

The area immediately to the west and north of the Klock site is open, gently rolling terrain that is dominated chiefly by various types of stony, clay-rich, and moderately well drained to poorly drained soils, as well as sizable areas of exposed bedrock that would have been of marginal to poor quality for aboriginal shifting cultivation. A short distance (1–3 mi) to the east and south are areas of the moderately productive Lansing and Angola-Wassaic soil associations with relatively deep topsoils. Potentially more productive areas of the sandy Windsor soils are located 3 to 5 miles to the northwest and northeast and could have been exploited by the inhabitants of the Klock site (Davis and Landry 1978; Figure 3). Excavations at the site revealed a 7- to 10-inch plow zone of disturbed topsoil. Below this the bouldery and clayey soils range from a mottled dark brown to gray-brown and light yellowish-brown in color.

INVESTIGATIONS: METHODS AND RESULTS

The Klock site has been known to local collectors since the 1920s. In 1949 avocational archaeologist Donald Lenig reported the site to the New York State Museum. During the summer of 1950, a museum field crew under the direction of State Archaeologist William A. Ritchie tested the site and spent approximately 4 weeks excavating storage pits. Lenig and other members of the Van Epps-Hartley Chapter, New York State Archaeological Association, conducted further work between 1951 and 1955. Not until 1969 did a museum crew under the direction of Robert E. Funk return to the site to begin more extensive excavations. Funk and his hired field crew were assisted by approximately 20 students from the University at Albany, SUNY, led by Peter S. Miller.

During the 1969 season the farm field containing the Klock site was owned by Mrs. Margaret Saltsman, who consented to the excavations. Over the winter she sold the farm to four new owners, Ms. P. Ewart, Ms. C. Start, and Mr. and Mrs. R. Maund, all of whom graciously granted permission for the continued explorations of 1970. Once again the State Museum crew was assisted by some 20 field school students, this time supervised by Philip Lord, Jr.

The principal goal of the work at Klock was to delineate the settlement pattern at the site. The site was laid out using a 10 foot grid, and the locations of features and post molds were carefully mapped for each square. A large area of the site was uncovered exposing numerous features and other remnants of the village settlement pattern. Approximately 21,000 square feet of the site were exposed over the course of the two field seasons. (All fieldwork at the Klock,

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[1] Also identified as Las. 8-4, NYSM 2333, and NYSOPRHP No. A035-04-0005. This site has been referred to as the Clock site (Lenig 1965:65-66; 1977:72, 78) and the spelling of Clock has been used occasionally by Funk and others. This is due to an erroneous usage that began because Ritchie's notes from 1950 use this spelling. The correct spelling is Klock (Ritchie and Funk 1973:327), after the old Klock family farmhouse adjacent to the site.

Smith-Pagerie, and Garoga sites was completed using English measurements. Because conversion to metric would create confusion and possible errors, we report these results using the system in use at the time. More recent artifact analyses are reported in metric measurements, which have become the norm in archaeological research.)

Upon the arrival of the field crew in 1969, it quickly became apparent that the surface contours of the field were uneven, displaying many irregularities consisting of small hollows and mounds amounting to differences in elevation of as much as 12 to 15 inches. The plow zone also displayed greater than usual variation in thickness, ranging from 7 inches to more than 15 inches. These irregularities may have been due in part to the plow occasionally striking and bouncing off large subsurface boulders causing it to gouge deeper into the subsoil in some parts of the field. No evidence of historic disturbances other than cultivation was observed during the investigations.

The focus of excavation was on those areas where test pitting and trenching had disclosed evidence of occupation represented by pit and hearth features and post molds. Early in the 1969 season, once it was known where the longhouses were concentrated, a bulldozer was hired to strip the plow zone off several thousand square feet of the central part of the ridge (Figure 4). This was intended as a way of speeding up the exposure of settlement pattern manifestations visible in the top of the subsoil. Hand excavation followed, but it soon became obvious that the heavy (20-ton) machine had compressed the thin remnant of plow-zone soil to form a hard clay-rich crust, resistant to hoeing and troweling. This slowed the work, and it was decided that during the 1970 season all excavation would be accomplished by hand.

During the 1969 season, what appeared to be the defensive palisade was located some 100 feet west of the main grid area. This palisade was successfully delineated for about 70 feet, but all traces petered out to the north and south (Figure 5). To search for additional parts of the palisade, for burials, and for possibly additional houses, 21 slit trenches were dug. These ranged from 20 to 250 feet long, averaged about 2 feet wide, and were located in the following areas: to the northwest of the stockade, between the stockade (W350 line) and the main grid, to the northeast of the main grid, directly east of the main grid, and to the southeast of the main grid. These trenches were uniformly not productive. None of them was mapped by transit; therefore none appears on the map, Figure 5. Also two long trenches were extended to the north and to the south of the main grid, and these do appear on the site map. The northern trench was intended to seek out additional structures and the rumored northern refuse dump, and the southern trench was intended to seek out additional houses, refuse dumps, and possible extensions of the stockade. Houses 1, 3, 4, 5, 7, and 8 were located and excavated. Parts of two more possible houses, Houses 2 and 6, were encountered in the southern trench. During the 1970 season, five more trenches, designated A, B, C, D, and E, and ranging from 40 to 60 feet long, were excavated southeast of the main grid to search for more houses or possible extensions of Houses 2 and 6. Rare post molds and two pit features were exposed in these trenches.

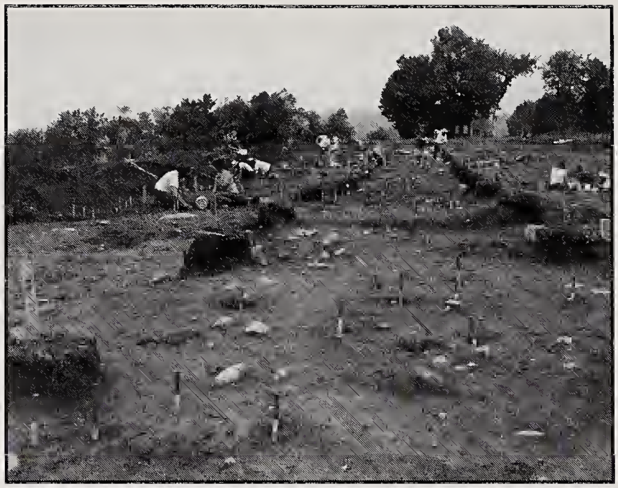


Figure 4. Photograph of excavations at the Klock site, 1969 season. Looking west from the lower field near the cliff overlooking Caroga Creek. Student crew is stripping off the plow zone and scraping the subsoil in search of post molds and pit features.

The long northern trench did not locate a palisade line or additional houses. (There were no features north of W150N90, and only one post mold was recorded at N105.) However, a meagerly productive refuse deposit was observed and partly excavated between the W150N100 and N140 units where the hill was sloping down from its crest toward the adjoining ravine. The southern trench failed to locate another dump or any convincing evidence of a stockade protecting the village on the long, moderately steep southern slope of the hill.

Artifacts recovered from the site were cleaned and cataloged and placed in storage at the New York State Museum. The excavations provided the basis

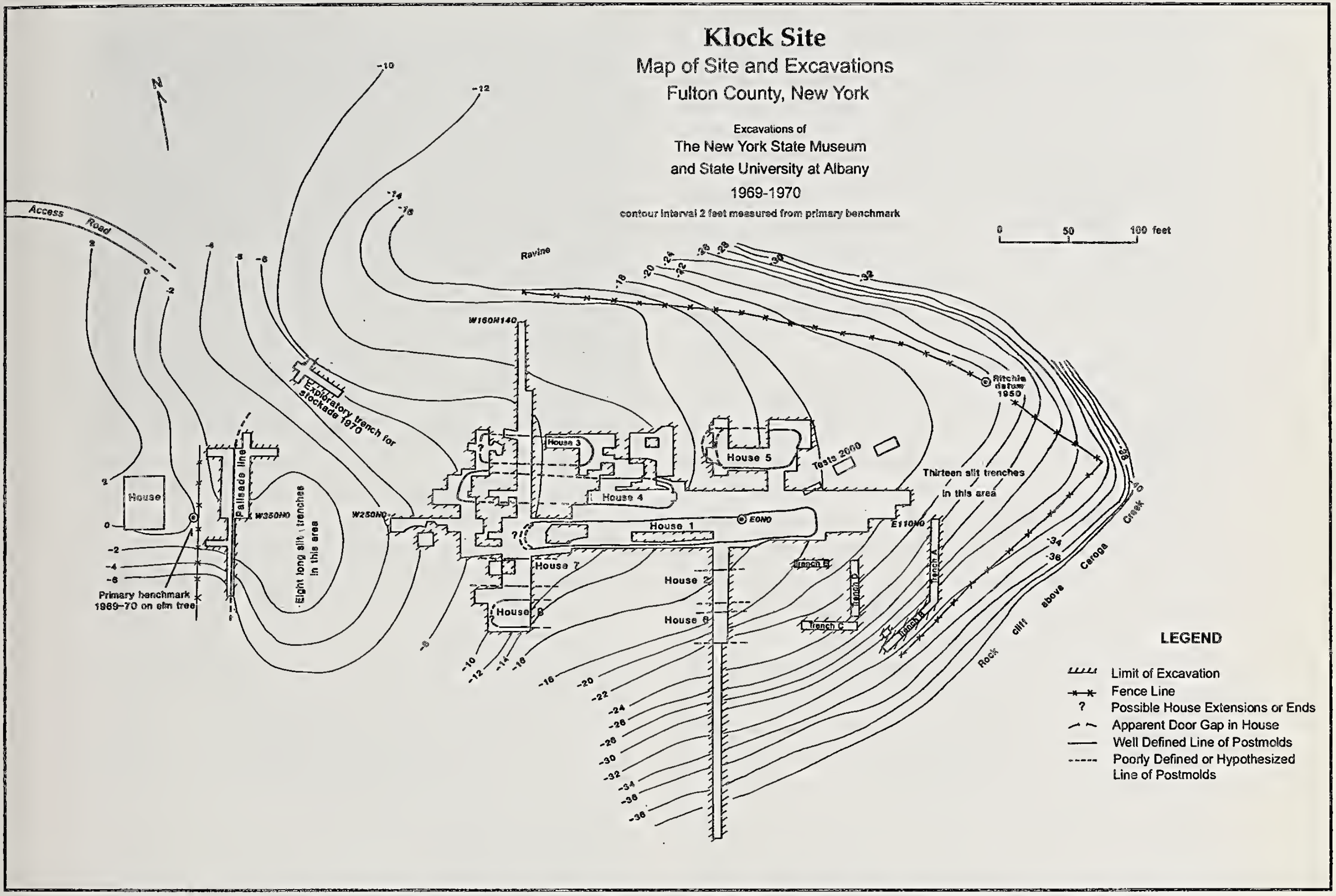

Klock Site
Map of Site and Excavations
Fulton County, New York
Excavations of
The New York State Museum
and State University at Albany
1969-1970
contour interval 2 feet measured from primary benchmark
0
50
100 feet
N
Access Road
Ravine
W160N140
Exploratory trench for stockade 1970
Palisade line
W350N0
Eight long silt trenches in this area
W250N0
House
Primary benchmark 1969–70 on elm tree
House 3
House 4
House 5
House 1
House 7
House 8
House 2
House 6
E0N0
Tests 2000
Thirteen silt trenches in this area
Ritchie datum 1950
E110N0
Trench A
Trench B
Trench C
Trench D
Trench E
Rock cliff above Caroga Creek
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
LEGEND
Limit of Excavation
Fence Line
? Possible House Extensions or Ends
Apparent Door Gap in House
Well Defined Line of Postmolds
Poorly Defined or Hypothesized Line of Postmolds

Figure 5. Map of Klock site settlement plan, showing excavated areas, longhouses, and palisade in relation to local topography.

for listing the Klock site on the National Register of Historic Places in 1979.

The primary area of excavation at the site is shown in Figure 5. Features and post-mold patterns were mapped. A representative number of post molds were cross-sectioned and profiled. Many of the more than 150 features discovered at the site were excavated, profiled, and photographed. The excavations uncovered post molds representing longhouses, bed lines, and palisades, a variety of features including hearths, storage pits, and refuse middens, a large assemblage of faunal and floral remains, more than 23,000 artifacts, and a dog burial. Most of the artifacts were recovered from excavated storage pits. No human burials were discovered in the excavations on the site. A promising sandy knoll 700 feet northwest of the site was thoroughly tested, but no burials were found.

LONGHOUSES

Due to the conditions imposed by the glacial substrate, it must have been difficult for the Indians to drive posts at close, regular intervals into the bouldery ground, and it was often difficult for the archaeologists to discern post-mold stains in the brown clay-silt matrix at the base of the plow zone. Those molds that were observed and recorded were often spaced widely apart and at irregular intervals. Others may have been missed entirely because they blended indistinguishably into the matrix. Molds that were relatively dark because they contained moderate to heavy amounts of charcoal were readily distinguished, but the fill of many molds displayed a light brown to medium brown color similar to that of the subsoil. In fact, the fill consisted chiefly of subsoil that had filtered or washed into the molds after the posts had rotted out or fallen out. Another problem was that the houses were placed on a ridge that sloped down to the east and south. This meant that during decades of plowing, the loosened soil tended to move downslope, thinning the plow zone and causing the plow to bite deeper into the subsoil through time. This surely obliterated many post molds, especially those that were relatively shallow to begin with. Therefore, for the reasons given, there was some uncertainty regarding the precise lengths and configurations of most of the longhouses.

The evidence indicates that there was a minimum of eight houses, all oriented roughly ESE–WNW along the long axis of the ridge (Figure 5). We considered the possibility that other houses existed between the W250 line and the palisade, a distance of about 100 feet (30 m), or down the eastern slope between E110 and the cliff overlooking Caroga Creek, a distance of about 200 feet (60 m), or in the areas to the north and south of the eight mapped houses. But no mold lines were observed in tests in the areas to the east or west, or in the long north-south exploratory trenches. Numerous small molds overlapping in one area with the large stockade molds do, however, present the possibility that at least one more structure, possibly a longhouse, existed between the stockade and main grid, but escaped detection within the slit trenches.

We could argue that the increasing slope of the ridge beyond the east end of the main grid (east of the E110N0 stake), amounting to a drop of 18 feet over a horizontal distance of 200 feet (60 m), precluded the construction of houses in that area. But, so far as can be determined from the 1950 field notes, Ritchie's investigations revealed the presence of at least a dozen pits north and east of the main grid. It remains possible that evidence of post-mold patterns escaped our search in that area. But brief test explorations (October 2000) in the area north and east of the mapped houses, amounting to 24 square meters, failed to uncover a single post mold or pit. Furthermore, surface examination and the inspection of looters' shallow, sterile-appearing pits in the area of the 1970 test trenches between houses and cliff tended to confirm our impression that no more houses remain to be found on the site.

The slope from the western edge to the eastern edge of the mapped houses was about 14 feet (Figure 5); one wonders whether the ground surface under the houses became uncomfortably wet during runoff from heavy rain or snowmelt.

Northernmost were Houses 3 and 5, believed to comprise two separate houses positioned end to end rather than one very long house. For one thing, the east end of House 3 was well defined, even though the west end of House 5 was not (Figure 5). In addition, there was a partially excavated area 75 feet wide containing scattered post molds, much empty space, and several rather widely dispersed features (Features 8, 135, 136, 142–145) where the houses would have joined (Figure 5). Furthermore, the widths of these houses differed considerably.

Immediately south of Houses 3 and 5 was House 4. House 4 was adjoined on the south by House 1 (Figures 5, 6, 8, 9). Farther south, in the western part of the main grid area (between W190 and W150), were incompletely exposed Houses 7 and 8, parallel to House 1 and to each other. To the east, in the long, north-south-running W20 trench, two possible houses, 2 and 6, were partly uncovered and if authentic would also have been parallel to House 1 and to each other.

If the observed arrangements of post-mold lines and features in the W20 trench actually represented houses, then Houses 2 and 7, and 6 and 8, were apparently positioned end to end. Though parallel, the wall lines of Houses 2 and 6 and Houses 7 and 8 were offset by some 10 to 20 feet, so it is extremely unlikely that these pairs matched up in the intervening unexcavated areas to form a single pair of houses. The spaces between houses ("streets") ranged from 5 to 20 feet wide.

House 1 was at least 212 feet long (Figures 5, 8, 9). Because the west end seemed to blend into a confusing group of features and post molds (Figure 6, 8) and a cluster of molds and features was located outside the east end, it was first believed that the house extended farther east and west for a possible length of 290 to 330 feet. However, the molds and features did not display any alignments potentially corresponding with the walls and interior parts of the house. Detailed examination of the map convinced Funk that the house could not have been more than 10 to 20 feet longer, for a possible maximum of about 230 feet. House 1 was 19 to 20 feet wide. The east end of House 1 was squared, the west end not distinct. No door gaps could be discerned in the east end. There was no obvious side entrance. Approximately 3,060 square feet (72 percent) of the total estimated area (at 212 ft in length) of 4,240 square feet were excavated.

House 3 was at least 82 feet long and was 20 feet wide. Because the post molds tentatively attributed to the west end were sporadic (Figure 7) and did not form a coherent line (possibly because of interference from a greater than usual concentration of boulders), it is possible the house extended into the unexcavat-

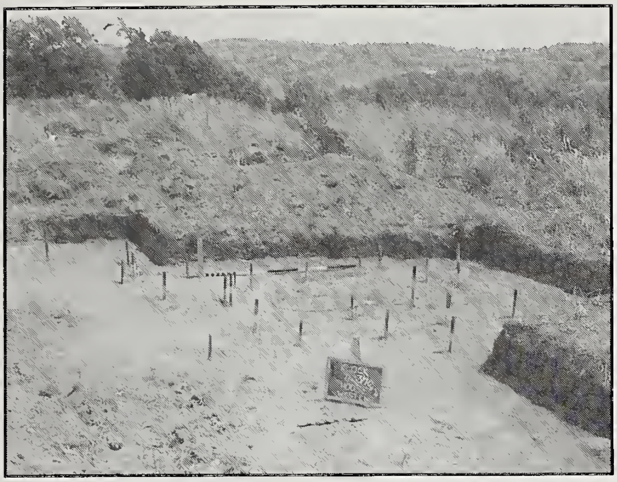


Figure 6. Photograph of post molds comprising the west end of House 1, Klock site. Looking southeast. The post molds are marked with short wooden stakes. The sparse distribution of molds will be noted. This was true of most houses at the Klock site.

ed units on the west. It could therefore have been as long as 112 feet. But because the area where the putative end was exposed (in more than 200 sq ft of excavation) was otherwise barren of hearths, pits, or other evidence of occupational activity, the true length was probably closer to the minimum estimate (Figure 5). The east end was rounded. Of the total minimum area of 1,640 square feet, approximately 255 square feet (15.5 percent) were exposed.

House 4 was 154 feet long. The width was 20 feet. The east end appears to have been rounded, with a wide door gap (10–12 ft) and a "baffle" or screen just outside it. More likely, however, the "baffle" was a divider between two gaps, each about 5 feet wide. Although the west end was almost certainly exposed in the excavations, it appeared incomplete, because there was a large gap of 7 feet between the molds extending northward from the south wall and the molds at the west end of the north wall. Some molds may have been plowed out. Approximately 1,335 square feet (43 percent) of an estimated total area of 3,080 square feet were exposed (Figures 5, 8–10).

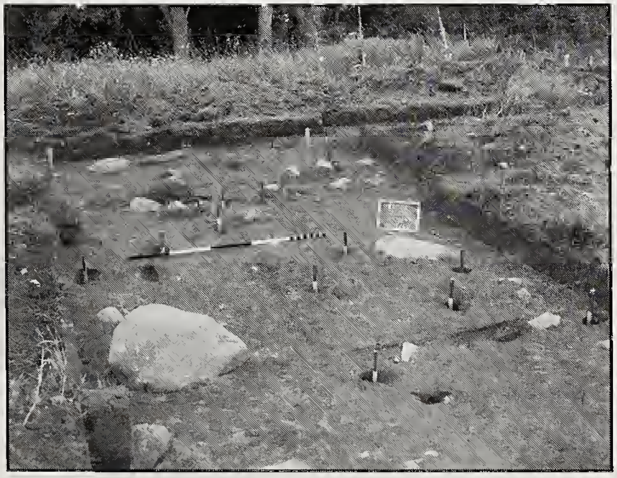


Figure 7. Photograph showing post molds marked by stakes in the west end of House 3, Klock site. Looking north.

House 5 was at least 65 feet long, and perhaps longer, because what was assumed to be the west end at the close of excavations was rather poorly defined (Figure 5). There is little reason to believe it extended more than 20 or 30 feet into the unexcavated units farther west, however, because there was considerable empty space in the excavated area (of ca. 1,000 sq ft) between Houses 3 and 5. This area contained only a small number of scattered features and post molds. The east end was straight but asymmetrical (not at right angles to the walls), due to the builders' need to avoid a large boulder at the northeast corner. House 5 appears to have been an unusual 26 feet wide. Approximately 576 square feet (34 percent) of the minimum estimated area of 1,690 square feet were excavated.

Houses 7 and 8. Only short middle sections of Houses 7 and 8 were exposed, therefore their lengths are unknown. Presumably, however, they were comparable in length to Houses 3 and 5 (ca. 60–100 ft). These houses were each about 20 feet wide. The north wall of House 7 paralleled the south wall of House 1 and enough was exposed to be confident of its reality. The south wall of House 7 was not seen in the limited area uncovered, but the arrangement of pits and hearths in more than 30 feet of excavation from east to west was sufficient to delineate the house. If the high density of features within the excavated area (ca. 500 sq ft) can be extrapolated to the whole house, then House 7 was fully occupied.

The north wall of House 8 was separated from the features believed to adjoin the south wall of House 7 by about 8 feet of blank space. A section of the north wall of House 8 was represented by a well-defined line of molds about 20 feet long, but the line seemed to peter out for the next 20 feet westward within the excavated area. The south wall was indicated by less closely spaced molds, again petering out toward the western part of the excavated area (Figure 11). The meagerness of molds in parts of the wall lines is probably due to the erosive effect of plowing on the slope. Only five features were present within the exposed portion of the house (ca. 800 sq ft), indicat-

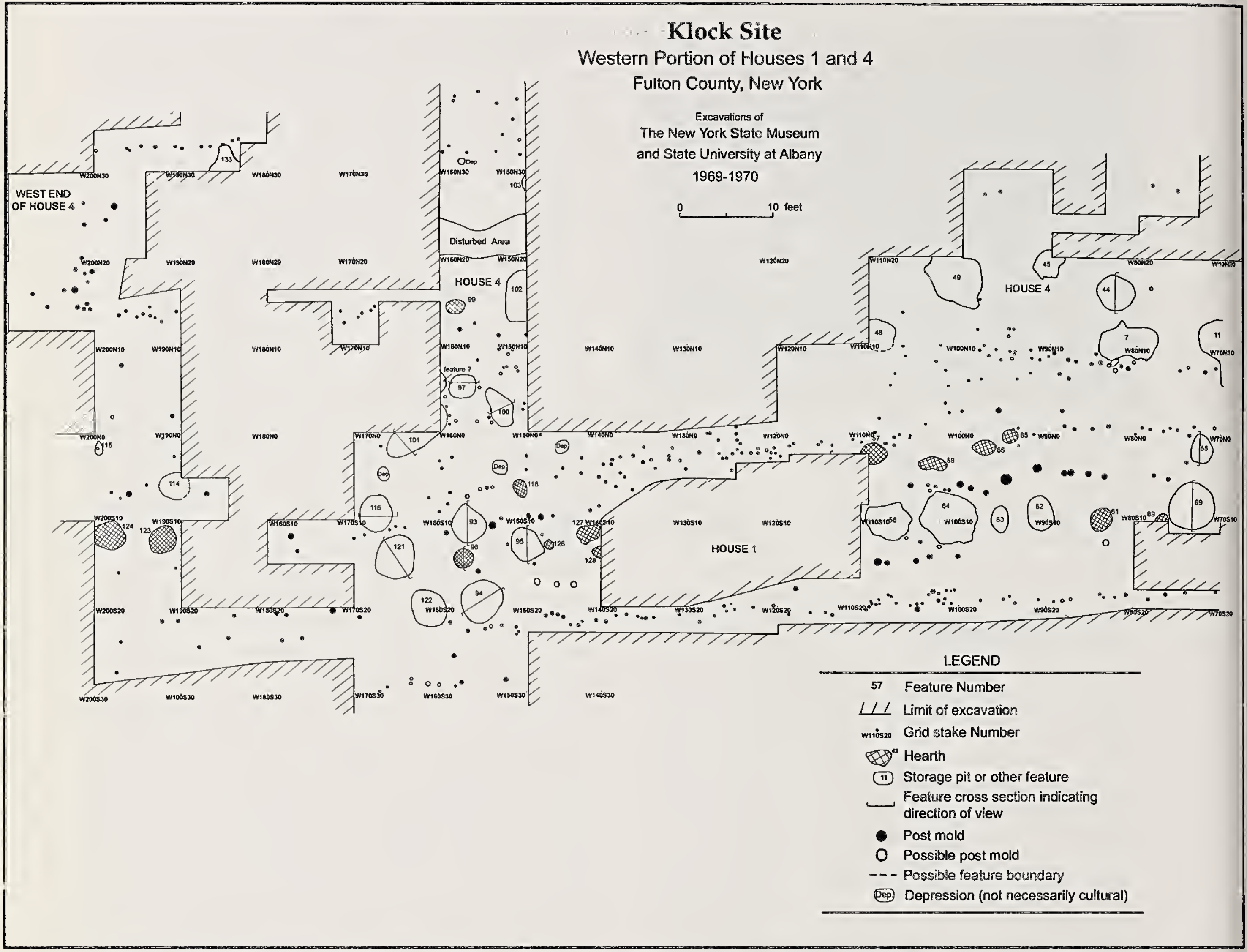
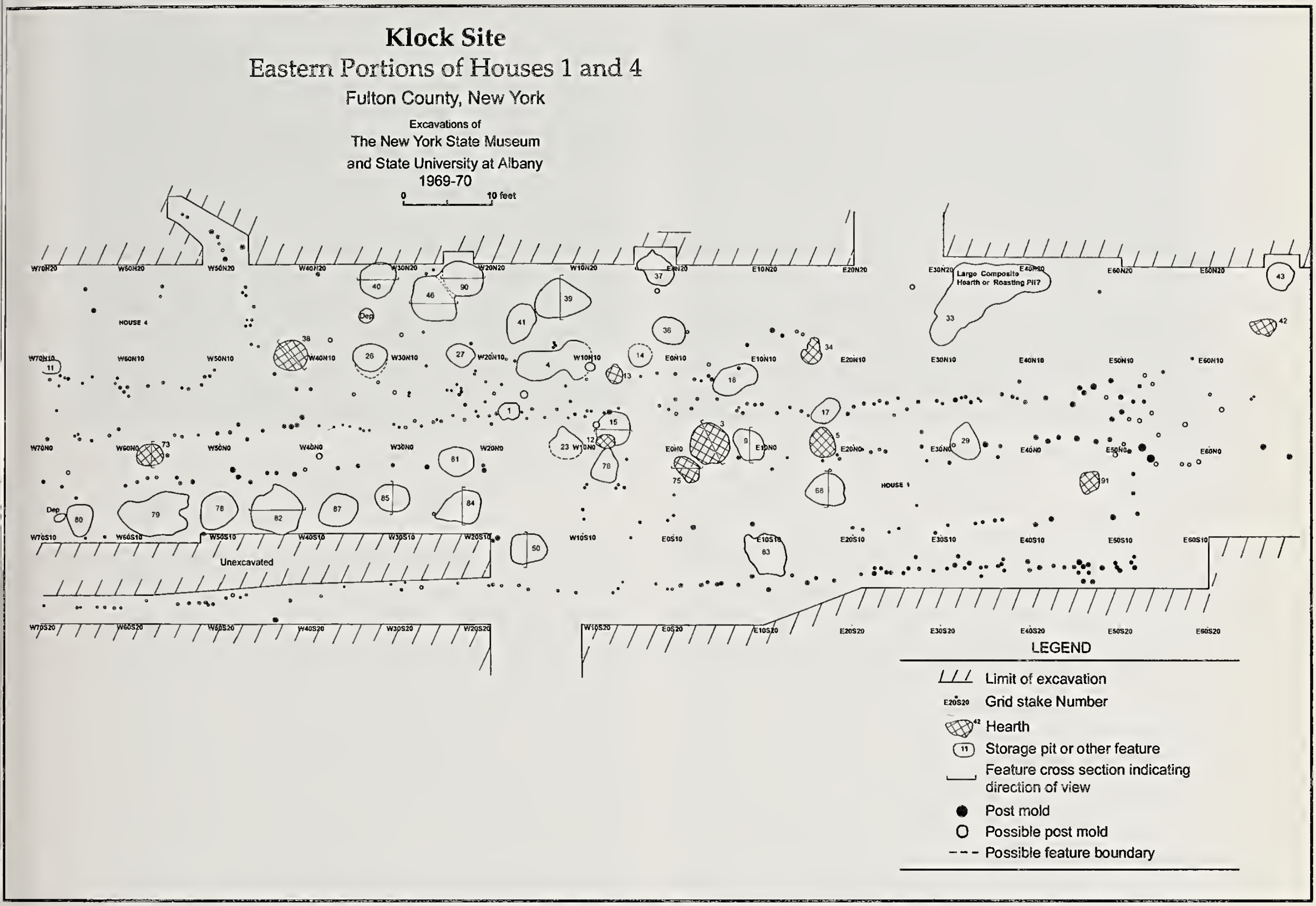

Klock Site
Western Portion of Houses 1 and 4
Fulton County, New York
Excavations of
The New York State Museum
and State University at Albany
1969-1970
0
10 feet
WEST END OF HOUSE 4
HOUSE 4
HOUSE 1
Disturbed Area
feature ?
LEGEND
57 Feature Number
Limit of excavation
W110S20 Grid stake Number
Hearth
11 Storage pit or other feature
Feature cross section indicating direction of view
● Post mold
O Possible post mold
--- Possible feature boundary
Dep Depression (not necessarily cultural)

Figure 8. Detailed map of western portion of Houses 1 and 4, Klock site. The basic internal structure of most Iroquoian longhouses is evident in the rectangular outline of the walls, in the large post molds of the bed lines averaging 5 to 6 feet from the side walls, in the rows of pit features between bed lines and walls, and in generally midline occurrence of hearths.

ing that it was less fully occupied than House 7 and perhaps more recently constructed.

Houses 2 and 6. The phenomena recorded in the W20 trench require more extensive discussion because they pose difficult problems of interpretation. The cluster of features and post molds just south of House 1, between the S20 and S50 lines in the W20 trench, did not seem to occur in a coherent pattern. There were no convincing lines of wall molds or bed-line molds running west-east; in fact a case could be made that the recorded molds represented the curved west end of a house about 20 feet wide, some of the features situated inside the house (Feature 52), others outside (Features 53, 54). If the features and molds were part of a house, House 2, its precise shape and size cannot be determined given the limited breadth of the excavation (ca. 200 sq ft of the possible structure were opened). The postulation that House 2 existed in this area, rather than an amorphous group of features associated with activities outside houses, must remain speculative.

There is no good evidence for assigning the next cluster of features to the south (Features 69–72), in Section W20S60, to any particular house. There was no association of putative wall lines. About 5 feet south of Feature 72 in Section W20S70 was the only


Klock Site
Eastern Portions of Houses 1 and 4
Fulton County, New York
Excavations of
The New York State Museum
and State University at Albany
1969-70
0
10 feet
HOUSE 4
HOUSE 1
Large Composite Hearth or Roasting Pit?
Unexcavated
Dep
W70N20
W60N20
W50N20
W40N20
W30N20
W20N20
W10N20
E0N20
E10N20
E20N20
E30N20
E40N20
E50N20
E60N20
W70N10
W60N10
W50N10
W40N10
W30N10
W20N10
W10N10
E0N10
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E30N10
E40N10
E50N10
E60N10
W70N0
W60N0
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W70S10
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W40S10
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E60S10
W70S20
W60S20
W50S20
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W30S20
W20S20
W10S20
E0S20
E10S20
E20S20
E30S20
E40S20
E50S20
E60S20
LEGEND
Limit of excavation
E20S20 Grid stake Number
42 Hearth
11 Storage pit or other feature
Feature cross section indicating direction of view
Post mold
Possible post mold
Possible feature boundary

Figure 9. Detailed map of eastern portion of Houses 1 and 4, Klock site.

well-defined east-west line of molds, which was successfully followed for 15 feet. No features or molds occurred in the space between the line and the feature. The line of small molds suggested a longhouse wall, but there was essentially open space with six scattered molds between the line and the next group of features to the south (Features 152–154). Two feet south of these features was a line of five evenly spaced large molds, similar in size to bed-line molds, and 3 to 4 feet south of that line was a short line of small molds possibly indicating another longhouse wall. If the relatively well defined northern and southern lines represented the north and south walls of a house, it was about 22 to 23 feet wide.

Although Houses 2 and 6 may well have actually existed in the area of the trench, other interpretations are possible. For example, it is possible that the line of large molds actually pertained to a stockade defending the south slope of the ridge and that this strong wall was accompanied by an outer defensive wall represented by the line of smaller molds on the south. In this event, Features 152 through 154 were not associated with a house, and perhaps even the line of small molds 18 feet to the north in Sections W20S60 and W20S70 was part of the defenses.

Without enlarging excavations in the area of the W20 trench, we cannot determine which interpretation is correct, given the limitations of the data. For the purposes of this report, we tentatively propose that two houses, 2 and 6, did exist in the area trenched and that there was no stockade line there.

Because only middle parts of Houses 6, 7, and 8 were exposed, the shape of the ends remains unknown. As previously mentioned, the distribution of the numerous post molds in the area of hypothesized House 2 could be interpreted to represent the rounded west end of the house.

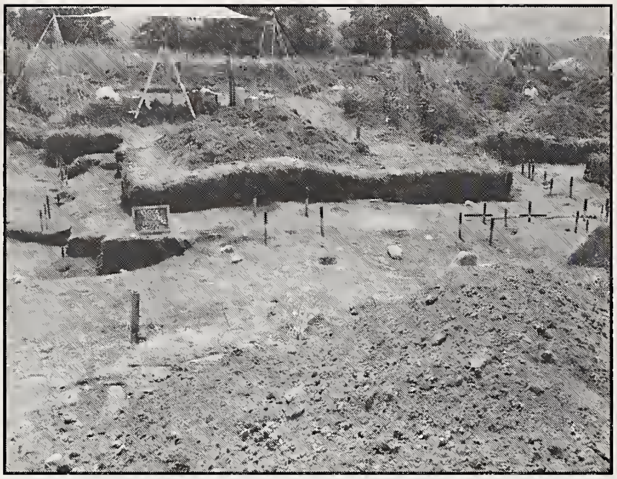

Figure 10. Photograph of post molds comprising the west end of House 4, Klock site. Looking east.

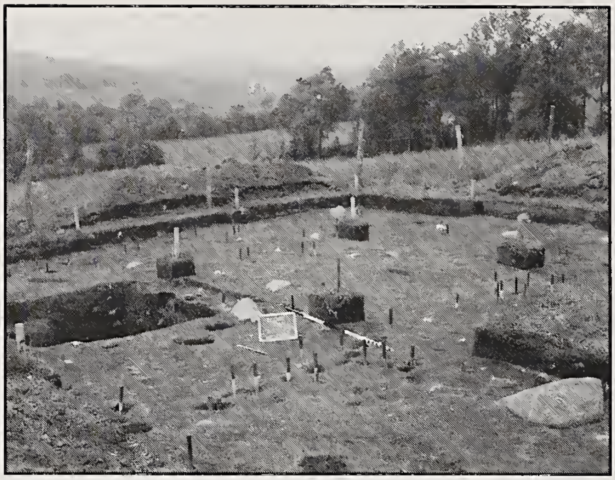

Figure 11. Photograph of a portion of House 8, Klock site. Looking southwest.

All of the houses contained features, classified chiefly as either storage pits or hearths. Generally hearths occurred along middle aisles, and pits occurred between the side walls and support post lines (i.e., under beds). But some hearths were located near walls and within bed lines, where the fires would have almost certainly damaged the houses. Perhaps these fires burned before construction of the houses or after the houses fell down and were only coincidentally situated within the wall patterns. Pits, however, although usually placed between side walls and bed lines, often occurred along aisles, sometimes in lines of three or more. This placement seems to have been deliberate, but logically these locations would have interfered with traffic along the aisles. Perhaps those pits were roofed over with branches or sheets of bark strong enough to withstand the weight of people walking across them.

Hearths were not present at regular intervals along midlines. They occurred sporadically (in our excavations), sometimes closely spaced in a line of two or three, other times absent over many feet. Some hearths may have been obscured by intersecting pits. Most hearths were observed as shallow patches of burned soil and were probably what remained of shallow, basin- or saucer-shaped features that had been largely plowed away. Others were probably completely obliterated by cultivation, accounting for the sparse and irregular distribution of hearths within the houses.

The last 31 feet of the eastern portion of House 1 contained only one pit feature and one hearth, suggesting a storage area, or an incompletely populated house (Figure 9). It is possible that this section had been added to an originally shorter structure. House 4 had relatively few internal features, at least within the excavated areas (Figures 8, 9). The eastern section, about 20 feet long, was almost devoid of features. House 5 lacked features within the exposed western portion, and those within the eastern portion were very sparse (Figure 5). As in the case of Houses 1, 4, and 8, the relatively low density of features suggests only partial occupancy. Judging from the concentration of features in the excavated portion, House 7 may have been fully occupied. This factor cannot be evaluated for Houses 2, 3, and 6 due to the small areas uncovered.

The relatively short length and greater breadth of House 5 as compared to its neighbors, the sparseness of interior features, and the odd shape of the east end (though apparently due to a large boulder in the northeast corner) all suggest it had a function unique to the site. Perhaps it served as a communal meeting place, council house or ceremonial center; unfortunately there were no indications of ceremonial activity within the excavated portions. The only unusual aspect of the interior was Feature 22, a pottery vessel intentionally buried in a shallow depression.

Post molds in the walls of Houses 1 and 4 as well as in other houses did not occur in rows at close, regular intervals (Figures 5, 8–10). They were grouped in bunches, some 2 to 3 feet long, others more than 30 feet long. (It is recognized that what constitutes "close, regular intervals" may be a matter of subjective judgment. The basis for such interpretations is of course a feeling for the practical requirements of constructing a longhouse wall.) Spaces between molds within the bunches generally varied from as little as

2 inches to 2 feet. There were surprising irregularities in the shape of the walls; instead of occurring in geometrically straight lines, the molds occasionally indicated wavy or undulating walls. These irregularities would have been accommodated and minimized when sheets of bark were attached to the outsides of the pole framework for the walls.

Evidence of partitions was nearly lacking within the houses. Only a few possible examples were observed. Rows of support posts were irregularly spaced, but where present were 4 to 5 feet from side walls. Lines of support or "bed" post molds in House 1 were up to 35 feet long; on the other hand, there were gaps up to 20 feet long. Support post molds in most houses were usually larger than wall molds, but House 4 may have been an exception, because the exposed segments of bed lines consisted of molds similar in diameter to wall molds.

POSSIBLE ATTACHED STRUCTURES

Near the west end of House 1, two curved, roughly parallel lines of post molds, one 10 feet long, the other 8 feet long, and running north to south, appeared to connect a gap in the north wall of House 1 with a gap in the south wall of House 4 (Figure 8). Was this a walkway connecting the houses for defensive purposes or for protection during inclement weather? The "street" just east of these lines contained more molds, appearing to form an open area or annex adjoining the north wall of House 1; more striking is the apparent absence in this area of a discernible north wall of House 1, the presence of two hearths (Features 59, 66) located where the beds would be, and a third hearth (Feature 65) that would be situated directly on the wall. These facts suggest that the divergences from "normal" patterns of house construction may have been deliberate; in other words, the gap in the north wall of House 1 and the associated structures were designed to connect the adjacent portions of Houses 1 and 4 and even to create a living and working space between them.

To the east of this area, lines of molds enclosing a space about 35 feet long and 3 to 6 feet wide may indicate a storage shed attached to the north wall of House 1 (Figure 9). But confusing the interpretations are a series of hearth features that, in addition to Features 59, 65, and 66, are located either on bed lines or overlap the north wall. These include Features 3, 5, 12, 57, 73, and 118. Obviously fires could not have been lit under beds or against walls without disastrous consequences. The implication is that these fires, and possibly those in Features 59, 65, and 66, burned either before construction of House 1 or after it had collapsed. The evidence does not indicate the presence in the area of other house patterns that overlapped Houses 1 and 4.

OTHER SETTLEMENT ASPECTS

Pits and hearths arranged in linear fashion can indicate the locations of houses where post-mold lines are sparse or absent. A cluster of hearths, pits, and scattered post molds at the west end of House 1, a small group east of House 1, and another group east of House 4, north of House 1, could conceivably indicate extensions of both houses that were poorly defined due to loss of molds through erosion and plowing (Figures 8, 9). Originally Funk hypothesized that House 1 may have extended to 290 or even 330 feet, and House 4 to more than 210 feet. The data have recently been reexamined in considerable detail. Because of their relatively high density, broad spacing and lack of alignment with the walls or midlines of those two houses, the molds and features on the west more likely related either to open-air activity areas or to other houses not sufficiently exposed in our excavations. The group of features north of House 1 and adjoining the east end of House 4 seems most likely to have resulted from activities performed outside both houses. The post molds and features did not occur in a linear pattern. Most striking was Feature 33, a large hearth complex perhaps representing a communal cooking area.

The small group of molds and features east of House 1 also appears to represent a separate, open-air activity area. A similar situation has already been proposed for the scattered post molds and features located in the area between Houses 3 and 5. Cases such as these do not necessarily reflect the presence of additional, poorly defined structures, but rather the use of areas outside or between houses as communal stations for food storage, cooking, and other activities when weather permitted. The post molds in these areas are generally scattered, although a few form lines up to a few feet long. These molds likely represent the erection of racks, isolated poles, and small storage bins or cribs in association with the features.

PALISADE

As previously noted, the defensive palisade was found approximately 100 feet west of the possible western extension of House 1; tests had failed to locate post-mold lines or features in the intermediate area. As expected, the palisade was oriented north-south in order to protect the village from surprise attack from the relatively level, readily accessible western part of the hill. The identification as a palisade was confirmed by the relatively large size of the molds, ranging from 6 to 24 inches in diameter. As far as can be determined from field notes some 30 years after excavation, except for a few small molds, depth measurements and profile drawings are not available for the palisade molds.

The line of large molds was rather straight and, proceeding from the first mold exposed to the south in Section W360S50, could be followed northward for a distance of about 72 feet (Figures 5, 13, 14). However, in Section W370N10 it petered out, the last large mold in line surrounded by a group of smaller molds. Some of the smaller molds occurred in lines suggesting a possible association with the west end of a longhouse or other structure. They did not seem to be part of the palisade, an entrance way, or an associated bastion. Some 22 feet to the north, in Section W370N30, were a few additional small molds and three large ones, the latter more or less in line with the main line of molds. The apparent gap is not easily explained, and we were unable to find more of the palisade to the north or south of the illustrated line, but it seems likely that much of it had been destroyed by heavy modern cultivation of the uneven surface of the hill.

Trenching at right angles to the line of large molds indicated a possible second and parallel line of smaller molds 6 to 8 feet outside (west of) the line of large molds. This suggests a double palisade. The

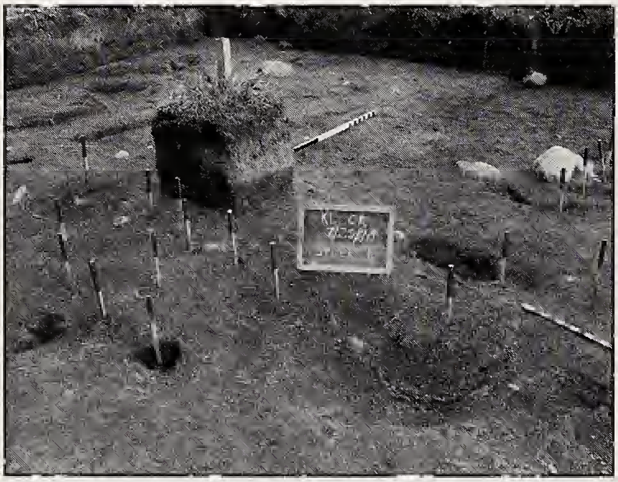

Figure 13. Photograph of selected post molds in the stockade, Klock site. Note their relatively large diameter, compared to the molds in house walls.

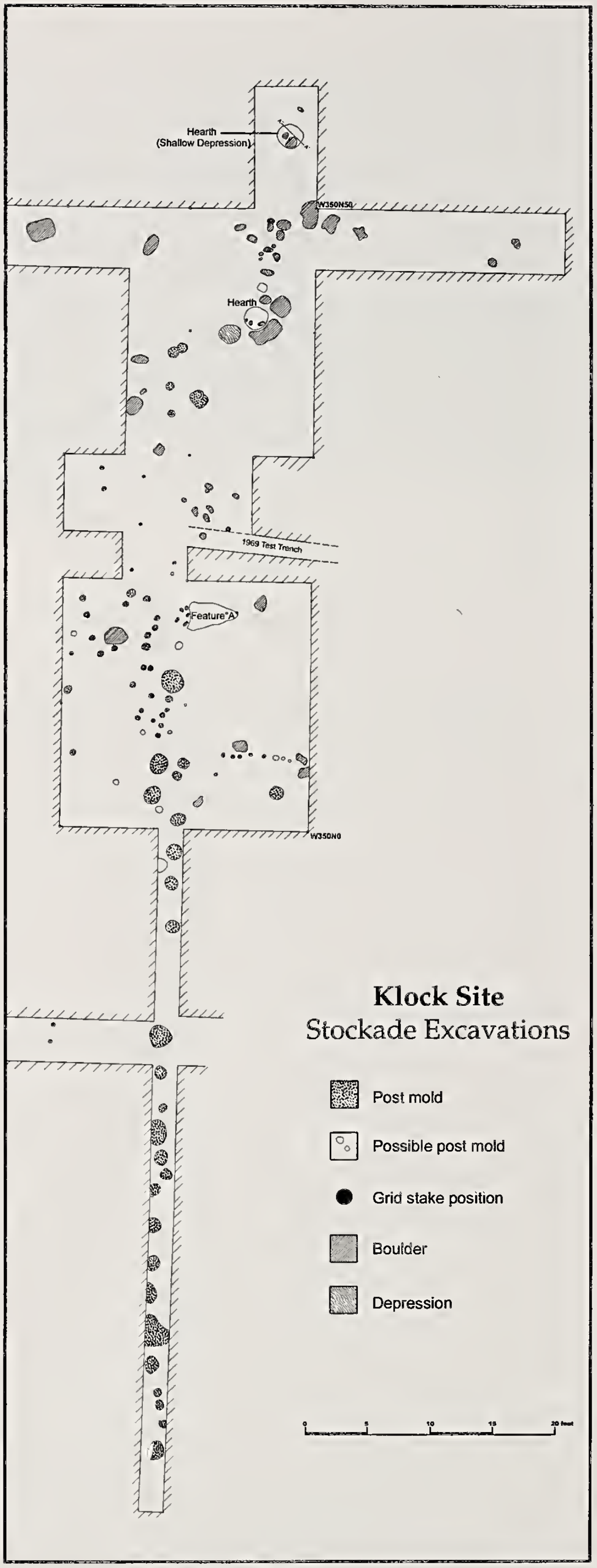

Figure 14. Detailed map of the stockade at the Klock site.

data are insufficient to support this hypothesis beyond reasonable doubt.

A rough estimate of the former total length of the palisade line, from the top of the southern slope to the top of the northern slope, is 300 feet. One would assume that these defenses extended some distance down both slopes, to prevent raiding parties from gaining easy access to the village by going around the ends of the stockade.

It was rather surprising that no evidence of a palisade was seen in the other trenches outside the main grid area, including the long trenches to the north and south. The long, high southern slope of the hill would have certainly slowed down even a highly fit group of attackers, and the cliff to the east would have also been a deterrent. The northern slope, west of the deep part of the ravine, was much gentler and would presumably have been less daunting to enemy raiding parties, but no trace of a palisade was found in the exploratory trenches. It remains possible, however, that defenses once existed in both of those areas, the evidence long since obliterated by plowing and erosion (see discussion of House 6 and the W20 trench, above).

POST MOLDS: ATTRIBUTES AND DESCRIPTIVE STATISTICS

Diameter and depth measurements were taken on limited numbers of cross-sectioned post molds in Houses 1, 4, 6, 8, and the palisade. Only diameter measurements are available for Houses 3 and 5. Data are almost completely lacking for Houses 2 and 7. These measurements, in inches, provide reasonably

Table 1. Klock Site Post-Mold Statistics, Diameters (Top) and Depths (Bottom)

DIAMETERS	House 1			House 3			House 4		House 5		House 6	House 8	Palisade
	N	S	B	N&S	E	W	S	E	N&S	E	N&S	N&S	
Mean	3.6	3.36	6.3	3.7	3.86	3.2	3.2	3.7	3.7	3.7	4.2	3.6	7.4
Mode	3	3	6	4	4	3	3	4	3.5	3.5	3	3.5	3.5
Median	3.5	3	6	4	4	3	3	4	4	4	4	3	5
Standard deviation	0.8	0.92	1.5	0.82	1.04	1.01	0.8	0.6	0.85	1.03	1.74	0.9	4.7
Range	3.5	5	6	4	4	4	4	2	3.5	3.5	6	4	22.0
Minimum	2	2	4	2	2	2	2	3	2.5	2	3	2	2
Maximum	5.5	7	10	6	6	6	6	5	6	5.5	9	6	24
N	29	31	24	28	25	17	39	16	23	20	11	43	65

DEPTHS	House 1			House 4	House 6	House 8
	N	S	B	S	N&S	N&S
Mean	7.7	8.8	9.98	5.2	9.14	6.8
Mode	6	5	12	4	7	4.3
Median	7	6.5	10	3	11	12
Standard deviation	2.44	4.8	2.47	2.71	3.16	4.2
Range	8.5	18	7	10.5	10	10
Minimum	4	4	7	2.5	3	2
Maximum	12.5	22	14	13	13	12
N	29	31	24	20	11	16

Note: N = north wall; S = south wall; N&S = north and south walls combined; E = east end wall; W = west end wall; B = bed lines. All measurements in inches.

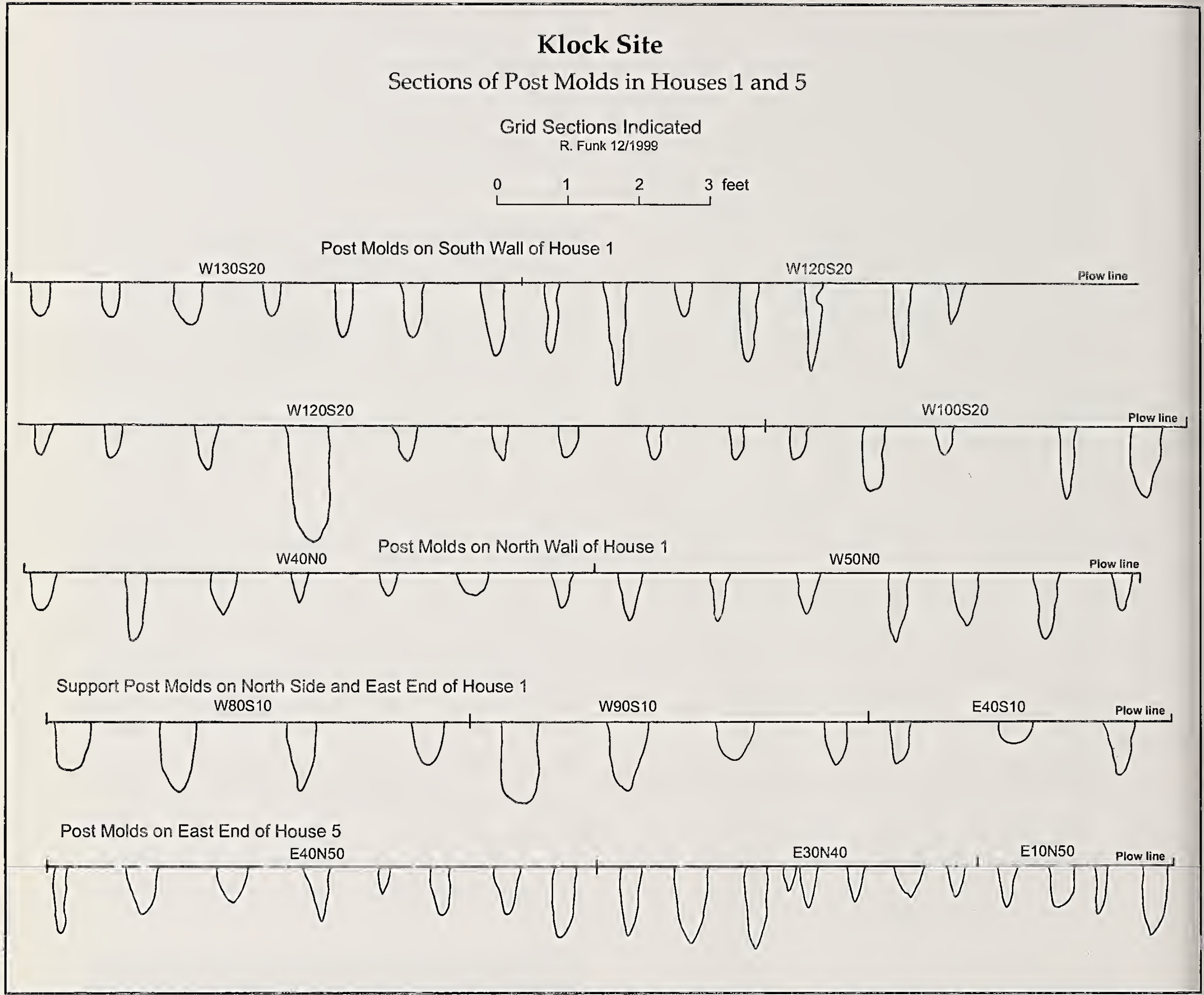
Klock Site
Sections of Post Molds in Houses 1 and 5
Grid Sections Indicated
R. Funk 12/1999
0
1
2
3 feet
Post Molds on South Wall of House 1
W130S20
W120S20
Plow line
W120S20
W100S20
Plow line
Post Molds on North Wall of House 1
W40N0
W50N0
Plow line
Support Post Molds on North Side and East End of House 1
W80S10
W90S10
E40S10
Plow line
Post Molds on East End of House 5
E40N50
E30N40
E10N50
Plow line

Figure 12. Graphic showing drawn profiles of a sample of post molds from houses, Klock site.

representative, unbiased samples of the hundreds of molds in the walls and bed lines of the houses. Table 1 provides the summary statistics for these samples.

The data show that the average diameter of wall post molds was between 3.2 and 4.2 inches, modally close to 3.6 inches, and average depth varied from 5.2 to 9.14 inches. In cross-section, house-wall post molds were generally slender and conical, narrowing from the top to a pointed or bluntly rounded tip. Some showed straight sides near the top, becoming conical in lower portions (Figure 12). These wall molds manifest the technique of building longhouse frameworks by forcefully driving saplings with sharpened tips into the ground. It is usually assumed this task was most easily accomplished during warm months of the year, especially when the ground was wet after rainfall or snowmelt. Winter frosts would have rendered the soil impenetrable.

Measurements on support posts are available only for House 1, where they averaged 6.3 inches in diameter and nearly 10 inches deep. Support post molds were generally wider than wall molds relative to their depth, and the bases or tips were bluntly rounded or even flat toward the center. Most of the support posts must have been placed in intentionally excavated holes, because they were too broad, heavy, and unwieldy to have been simply driven into the ground. Samples of post-mold profiles are shown in Figure 12.

The data for palisade post molds include not only the large molds but also the array of smaller molds in Sections W370N10 and W370N30. It should be noted that many of the small molds may not have been part of the palisade but may instead represent an overlapping longhouse or other structure. Therefore, the average post mold diameters attributed to the palisade may be smaller than the prehistoric reality. Even though this average may include some inadvertent longhouse molds, it is significantly greater than the average post molds of the houses at the site. Clearly there was a conscious decision to use much larger and stronger timbers for the construction of the palisade that fortified the village.

FEATURES OTHER THAN POST MOLDS

Table 2 is a complete list of recognized features at the site, characterized chiefly as either hearths (sometimes in the form of thin lenses of fire-reddened soil, charcoal, and fire-cracked rocks but usually occurring in shallow saucer or basin-shaped depressions) or storage pits (generally larger and deeper than hearths, basin-shaped, conoidal, or cylindrical in form and lacking burned soil except for occasional hearth sweepings in the fill). Although there were ambiguous cases, generally features that were exposed at the junction of plow zone and subsoil but not excavated, it is clear that pits predominated over hearths (by a ratio of 2:1). Other, less frequent, categories include a dog burial, a partially buried, nearly complete pottery vessel, a post mold, and shallow depressions. The table presents the number of each feature, its location in the grid or in test trenches, whether or not it was excavated, its assignment to houses or other settlement aspects, its functional category, its horizontal dimensions, and if excavated, its depth and calculated volume.

The horizontal dimensions of excavated features just below their rims or mouths often turned out to be smaller than when first encountered at the junction of plow zone and subsoil. This means the recorded diameters of unexcavated features should be considered approximate. It should be noted that the number of recorded features is not 158, due to the retirement of some numbers initially assigned to features in the field. The actual total is 153, including the division of Feature 4 into 4A and 4B. Following the table is a summary of the association of features with houses, in turn followed by a discussion of features and their attributes.

Table 2. Klock Site List of Features

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
1	W20N0	No	House 1	Pit	30 x 24	
2	E80N0	Yes	East of east end 1	Pit	52/47	99,814
3	E0S10-N0	Yes	House 1	Hearth	43/6	2,875
4A	W20N0-N10 W20-W10N10	Yes?	East of east end 4	Pit	38 x 40	
4B	W10-W20N0,	Yes?	East of east end 4	Pit	36 x 54	
5	E10S10-N0	No	House 1	Hearth	36	
6	E70-E80N0	No	East of east end 1	Pit (2?)	72 x 36	
7	W80-W90N0, W80-W90N10	Yes	House 4	Pit (2 intersecting)	84 x 42	

Continued on next page

Table 2—Continued

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
8	W100N50	Yes	Between 3 and 5	Pit	39/18.5	7,293
9	E0S10-N0	Yes	House 1	Pit	36 x 42/33	39,421
10	E80S10?	Yes	?	Pit	?/42	
11	W70-80N0, W70-W80N10	Yes?	House 4	Pit	40 x 48	
12	W10S10-N0	Yes	House 1	Hearth	24	
13	W10N0	No	East of east end 4	Hearth	20	
14	W10N0-N10	No	East of east end 4	Pit	36	
15	W10N0	No	House 1	Pit	48/28	50,667
16	E0N0	No	East of east end 4	Pit	60 x 36	
17	E10N0	No	House 1	Pit	36 x 24	
18	E30N40-50	No	House 5	Pit	48	
19	E40N40-50, E50N40-50	No	Outside east end 5	Pit	48	
20	E40N50	Yes	Outside east end 5	Pit (2?)	48 x 60/30	22,673
21	E40-E50N50	No	Outside east end 5	Hearth	16	
22	E20N50	Yes	House 5	Pottery vessel in depression		12
23	W20S10-N0	No	House 1	Pit	44 x 36	
24	E90N0-N10	Yes	East of east end 1	Pit	60 x 48/36	27,208
25	E90N0	No	East of east end 1	Pit (?)	30 x 36	
26	W40N0-N10	No	East of east end 4	Pit	36 x 48	
27	W30N0-N10	No	East of east end 4	Pit	36 x 27	
28	E90N0-S10	No	East of east end 1	Pit (?)	36	
29	E30N0-S10	No	House 1	Pit	36 x 48	
30	E20N60	No	Outside north wall of 5	Hearth	27 x 18	
31	? Data missing	No (top 1 inch)	?	Pit	No data	

Table 2—Continued

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
32 (not used, part of Feature 33)						
33	E20-E30N10, E40N10-N20	Yes	East of east end 4	Composite hearth, incorporated Feature 32	72 x 168/18	
34	E10N0-N10	No	North of 1	Hearth	27 x 36	
35	E170N10	Yes	?	Pit	60/48	135,717
36	E0N10-W10N10	Yes	East of east end 4	Pit	36 x 42	
37	W10N10-N20	Yes	East of east end 4	Pit	36 x 48/26	11,887
38	W50N0-N10	Yes	East of east end 4	Hearth	42/15	6,857
39	W10-W20N10	Yes	East of east end 4	Pit (with superimposed hearth)	72 x 48/36	101,787
40	W40N10	Yes	East of east end 4	Pit	48/15	8,957
41	W20N10	No	East of east end 4	Pit	36 x 48	
42	E60N10	Yes	East of east end 1	Hearth	36 x18/14	
43	E60N0-N10	Yes	East of east end 1	Pit	36	
44	W90N10	Yes	House 4	Pit	54 x 48/18	38,227
45	W90N0-W100N10, W90N10-20	No	House 4	Pit	48 x 36	
46	W30N10	Yes	East of east end 4	Pit	72 x 48/23	21,460
47 (not used, same as Feature 19)						
48	W110-W120N10, W110N0, W120N0	No	House 4	Pit	36 x 42	

Continued on next page

Table 2—Continued

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
49	W100-W110N10	No	House 4	Pit (2?)	66 x 84	
50	W20S20	Yes	House 1	Pit	45 x 40/42	58,189
51	W20S20	No	House 1	Hearth	Insufficient data	
52	W10-W20S40	No	House 2?	Pit	48	
53	W20S30-S40	No	House 2?	Pit	84	
54	W20S30-S40	No	House 2?	Pit	36+	
55	W80S10	Yes	House 1	Depression (disturbance?)	36 x 30/6	1,693
56	W110S10-S20	Yes	House 1	Pit	60 x 48	
57	W110-W120S10	Yes	House 1	Hearth	36 x 30	
58 (not used, same as Feature 64)						
59	W110S10	No	House 1	Hearth	36 x 15	
60	W80S10-S20	Yes	House 1	Pit	60/40	113,097
61	W90S10-S20	Yes	House 1	Hearth	30	
62	W90-W100S10, W90-W100S20	No	House 1	Pit	48 x 36	
63	W100S10-S20	No	House 1	Hearth	36 x 24	
64	W100-W110S10, W100-W110S20	No	House 1	Pit	72 x 66	
65	W100S10	Yes	House 1	Hearth	18	
66	W100S10	Yes	House 1	Hearth	36 x 22	
67	W20-W30S30	No	Between 1 and 2?	Pit	18+	
68	E10S10	Yes	House 1	Pit	52 x 42/51	92,288
69	W20S60	No	Between 2 and 6?	Pit	72	

Table 2—Continued

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
70	W20S60	No	Between 2 and 6?	Hearth	24 x 18	
71	W10-W20S60	No	Between 2 and 6?	Hearth	24	
72	W20S60	No	Between 2 and 6?	Pit	36 x 27	
73	W60S10	Yes	House 1	Pit or hearth	36 x 30/15	4,233
74	Test trench	Yes	?	Pit	41/38	50,170
75	E0S10	Yes	House 1	Hearth	42 x 36/4	1,577
76	W10S10	No	House 1	Pit or hearth	44 x 30	
77 (not used)						
78	W50-W60S10	No	House 1	Pit	54 x 48	
79	W70S10	No	House 1	Pit	84 x 54	
80	W70S10	No	House 1	Pit	42 x 36	
81	W30S10	Yes?	House 1	Pit	48 x 36	
82	W50S10	Yes	House 1	Pit	72 x 60/43	59,574
83	E0-E10S20	No	House 1	Pit	54 x 48	
84	W30S10	Yes	House 1	Pit	42 x 60/48	101,939
85	W30-W40S10	Yes	House 1	Pit	48 x 36/57	78,970
86	W20N60	Yes	North of west end 5	Pit	46 x 42/42	63,862
87	W40S10	No	House 1	Pit	54 x 42	
88 (not used, same as Feature 79)						
89	W80S10	No	House 1	Hearth	24	
90	W30N10	Yes	East extension 4?	Pit	48/24	14,331
91	E40S10	No	House 1	Hearth	26	
92	W110S20	Yes	House 1	Post mold		
93	W160S10-S20	Yes	House 1	Shallow depression	48/9	5,374

Continued on next page

Table 2—Continued

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
94	W160S20-S30	Yes	House 1	Pit	52 x 60	
95	W150-W160S20	Yes	House 1	Pit	48 x 60	
96	W160S20	Yes	House 1	Hearth	27/8	1,511
97	W160N0	No	Between 1 and 4	Hearth or pit	39 x 30/6	1,905
98	W150N40	No	House 3	Hearth	33 x 27	
99	W160N10	No	House 4	Hearth	26 x 18/7	878
100	W160N0	Yes?	Between 1 and 4	Pit	30 x 60	
101	W160-W170N0, W160-W170S10	Yes?	Between 1 and 4	Hearth or pit (2?)	96 x 42/8	10,160
102	W150-W160N10	Yes?	House 4?	Pit	72+	
103	W50-W160N20	Yes?	House 4	Pit	24/24	
104	W150-W160N70	Yes?	North of 3	Hearth?	24	
105	W160N60	Yes	North of 3	Pit	72 x 36	
106	W160S40	Yes	House 7	Hearth	36 x 24/6	1,400
107	W150-W160S40, W150-W160S30	Yes?	House 7	Pit	Insufficient data	
108	W160-W170S40	Yes?	House 7	Pit	36	
109	W160-W170S40	Yes?	House 7	Hearth	24	
110	W160S40	Yes	House 7	Hearth	24/9	1,343
111	W160S40	Yes	House 7	Pit or hearth	24/21	9,500
112	W160S50	Yes?	House 7	Pits, two intersecting		72
113	W160N50	Yes	House 3	Pit	48 x 42	
114	W190-W200S10	Yes?	West extension 1?	Pit	39	
115	W200S10	Yes?	West extension 1?	Pit or hearth	12 x 18	
116	W170S10-S20	Yes	House 1	Pit	42 x 48/25	39,760
117	W160S70	Yes	House 8	Pit	52 x 48/51	100,138

Table 2—Continued

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
118	W150-W160S10	No	West extension 1?	Hearth	24	
119	W170S80	No	House 8	Hearth	60 x 42	
120	W170-W180S60, W170-W180S70	Yes	House 8	Pit	72	
121	W170S20	Yes	West extension 1?	Pit	54 x 60/50	123,151
122	W160-W170S20, W160-W170S30	No	West extension 1?	Pit or hearth	48 x 54	
123	W200S20	No	West extension 1?	Pit?	36	
124	W200-W210S20	No	West extension 1?	Hearth	42 x 48	
125	W160N110-120	No	North midden trench		?	Insufficient data
126	W150S20	No	House 1	Hearth	18 x 12	
127	W150S20	No	House 1	Hearth	32 x 24	
128	W150S20	No	House 1	Hearth	15	
129	W170S70	No	House 8	Pit	48 x 24	
130	W180S40	Yes	House 7	Pit	48/39	70,573
131	W180S80	No	House 8	Pit	72	
132	W220N10	Yes?	House 7?	Pit	Insufficient data	
133	W190N20-N30	No	House 4?	Pit	Insufficient data	
134	W230S20	Yes	West extension 1?	Hearth	42 x 52	
135	W60N40-N50	Yes	Between 3 and 5	Pit	48	
136	W60N30	Yes	Between 3 and 4	Pit	54 x 46/41	80,504
137	W120N40	Yes	House 3	Hearth	54 x 36/24	12,596
138	W110N50	Yes	House 3	Hearth	24 x 30	
139	W120-W130N50	Yes	House 3	Pit	48 x 36/36	16,459
140	W140N50	No	House 3	Hearth	27 x 36	
141	W140-W150N50	No	House 3	Pit	36+	

Continued on next page

Table 2—Continued

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
142	W110N40	No	Between 3 and 5	Pit	54 x 48	
143	W110N30-N40	No	Between 3 and 4	Pit or hearth	30+	
144	W70N40-N50	Yes	Between 3 and 5	Pit	60/43	40,121
145	W90N30	No	Between 3 and 5	Pit	Insufficient data	
146	W50N30	Yes	Between 3 and 5	Pit	No data	
147	W50N40	Yes	Between 3 and 5	Pit or hearth	No data	
148	W60N60	No	House 5?	Small depression	Insufficient data	
149	W160N0	No	Between 1 and 4	Small depression	Insufficient data	
150	W160N60	No	North of 3	Pit?	Insufficient data	
151	W180S40-S50	No	House 7	Hearth	48	
152	W20S80	No	House 6?	Hearth	36	
153	W20S80	No	House 6?	Ash lens (hearth?)	48 x 18	
154	W20S80	No	House 6?	Pit	60 x 38	
155	W170S40-50	Yes	?	Dog burial	32 x 16	
156	E135S50,	Test Trench A	No	Pit	48	
157	Test Trench E	No		Pit	Insufficient data	
158	W360N40	No	Stockade area	Hearth	24	

THE LOCATIONS OF FEATURES INSIDE AND OUTSIDE OF HOUSES

House 1. Features 1, 3, 5, 9, 12, 15, 17, 23, 29, 50, 51, 55–57, 59–66, 68, 73, 75, 76, 78–85, 87, 89, 91–96, 116, 126–128.

Central hearths: Features 61, 63, 75, 89, 91, 126–128.

Other hearths: Features 3, 5, 57, 59, 65, 66, 73, 96.

Midline pits: Features 50, 56, 60, 62, 64, 68, 78–80, 82, 84, 85, 87.

Excavated features: 3, 9, 12, 50, 55–57, 60, 61, 65, 66, 68, 73, 75, 81, 82, 84, 85, 92–96, 116.

Possible westward extension: Features 114, 115, 118, 121–124, 134. Excavated features: 114, 115, 121, 134.

Outside east end: Features 2, 6, 24, 25, 28, 42, 43. Excavated features: 2, 24, 42, 43.

House 2. Features 52–54.
- Central hearths: none exposed.
- Midline pits: Features 52, 54.
- Between Houses 1 and 2: Feature 67.
- Between Houses 2 and 6: Features 69–72.

House 3. Features 98, 113, 137–141.
- Central hearths: Features 98, 137.
- Midline pits: feature 113.
- Excavated features: 113, 137–139.
- Outside north wall: Features 104, 105, 150. Excavated features: 104, 105.

House 4. Features 7, 11, 44, 45, 48, 49, 99, 102, 103, 133.
- Central hearths: Feature 99.
- Midline pits: Features 44, 45, 49, 103.
- Excavated features: 7, 11, 44, 102, 103.
- Outside east end of house: Features 4A, 4B, 13, 14, 16, 26, 27, 33, 34, 36–41, 46, 90. Excavated features: 4A, 4B, 33, 36–40, 46, 90.
- Between Houses 1 and 4: Features 97, 100, 101, 149. Excavated features: 100, 101.

House 5. Features 18, 22, 148.
- Central hearths: none exposed.
- Midline pits: Features 18, 22. Excavated feature: 22.
- Outside east end: Features 19–21. Excavated feature: 20.
- Outside north wall: features 30, 86. Excavated feature: 86.
- Between Houses 3 and 5: Features 142, 143, 145. Excavated features: 8, 135, 136, 144, 146, 147.

House 6. Features 152–154.
- Central hearths: Features 152, 153.
- Midline pits: Feature 154.

House 7. Features 106–112, 130, 132, 151.
- Central hearths: Features 109, 110.
- Midline pits: Features 108, 111.
- Excavated features: 106–112, 130, 132.

House 8. Features 117, 119, 120, 129, 131.
- Central hearths: none exposed.
- Midline pits: uncertain.
- Excavated features: 117, 120.

DISCUSSION OF FEATURES

Although there were two basic categories of features (i.e., pits and hearths), with pits numerically predominant, the other categories merit brief discussion. These include shallow, often amorphous depressions, some of which must be very recent in origin. In some cases depressions simply contained brown sandy fill lacking artifacts or other indications of cultural activity; these were not assigned feature numbers, because they appeared to be the result of boulders dragged out of their original position by the plow. Feature numbers were given to depressions that did produce some cultural material. Another feature (Feature 22) consisted of a pottery vessel, seemingly deliberately placed rim up in a shallow depression (Figure 15); a dog burial (Figure 17; Feature 155), also in a shallow depression; a post mold, selected for its unusually high artifact content (Feature 92); and combinations of pits and hearths (Feature 39).

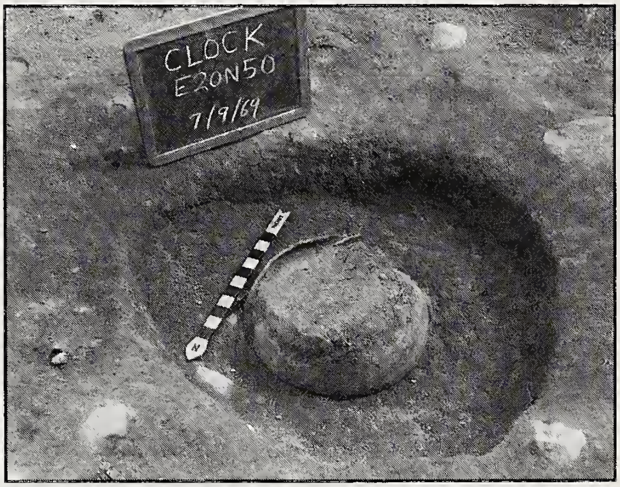

Figure 15. Photograph of a nearly whole pottery vessel, Feature 22, Klock site, exposed just below plow zone.

Pits were generally distinguished from hearths by their greater depth, their cross-section shape (cylindrical, conoidal, or basin shaped), and the absence of evidence that they were intended primarily for containing fires. Pits also tended to produce larger quantities of artifacts and subsistence remains than hearths.

Hearths were identified by their generally shallower depth, by the presence and often abundance of fire-cracked stones, charcoal, ash and fire-reddened soil, and the lower quantities of artifacts. In cross-

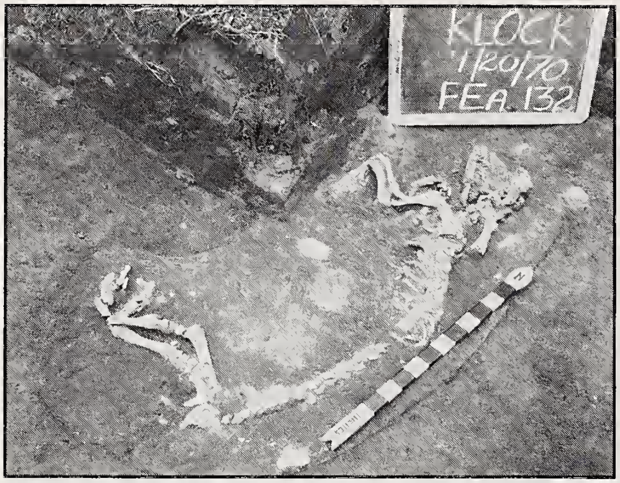

Figure 17. Photograph of a dog burial, Klock site, Feature 155.

section they were frequently saucer shaped, rarely basin shaped (Figure 16). Many hearths were merely patches or lenses of burned soil, sometimes containing fire-cracked rocks and charcoal.

Rare combinations of pits and hearths occurred when fires were built over the top of filled pits (Feature 39). There were also ambiguous cases where hearths, some in basins, were not easily distinguished from pits (Features 73, 76, 97, 101, 104, 111, 115, 122, 143, 147). However, many in this group were not excavated, and the classification of pit or hearth was based on the surface attributes of the feature. In other examples, the shape suggested a hearth, but the fill and surrounding sand matrix lacked clear signs of fire.

Pits showed great variation in the structure and contents of the fill (Figures 18–21). In some the fill was homogeneous and almost indistinguishable from surrounding subsoil. Others had homogeneous fill but showed more contrast with subsoil. A majority (84 percent) of excavated and cross-sectioned pits was stratified, often showing multiple, complex layers and lenses (some hearths also displayed stratification). Some of the complexly stratified pits showed vivid colors—gray, black, red, brown, yellow—in profile. Nearly all contained artifacts, debitage, refuse bone, charred corn, charcoal, fire-cracked rock, and other items in varying quantities. Some layers appeared to be hearth sweepings, consisting largely of charcoal, reddened earth, fire-cracked rocks, and even ash. (They did not represent the building of fires in the pits themselves.) Other layers represented the remains of meals. Yet other layers were of sand, often lacking in artifacts or refuse, and these were probably thrown in on top of refuse for sanitation purposes. Some pits contained unburned cobbles and boulders in contrast to fire-cracked rocks; apparently boulders were sometimes rolled into the pits to get them off the longhouse living floor. A small number of pits evinced thin dark brown to black lenses at the base and lower sides. These were frequently identifiable as the remains of bark or grass linings intended to line the pits and keep out vermin. There is little doubt that pits, per se, functioned for storage of foodstuffs such as corn, beans, and squash. Eventually they would become infested with vermin and mold, the side walls would collapse, or they would simply outlive their usefulness and be filled with refuse.

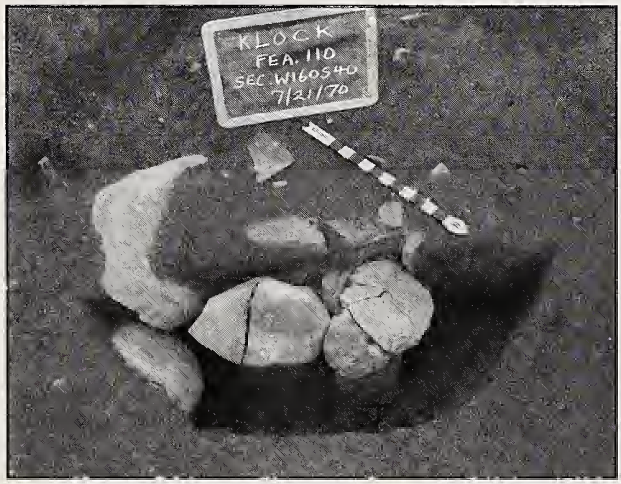

Figure 16. Photograph of a cross-sectioned hearth, Feature 110 in House 7, Klock site.

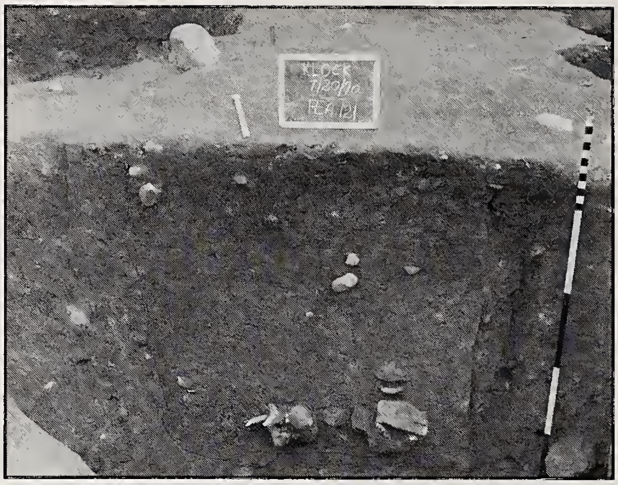

Figure 18. Photograph of a cross-sectioned storage pit, Feature 121, Klock site. Note the almost complete lack of stratification.

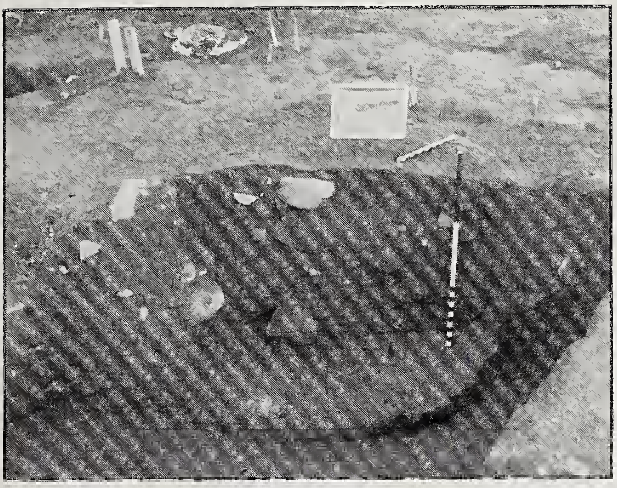

Figure 19. Photograph of a cross-sectioned storage pit, Feature 94. Vague stratification is evinced by the lighter lens of fill in the upper part of the profile.

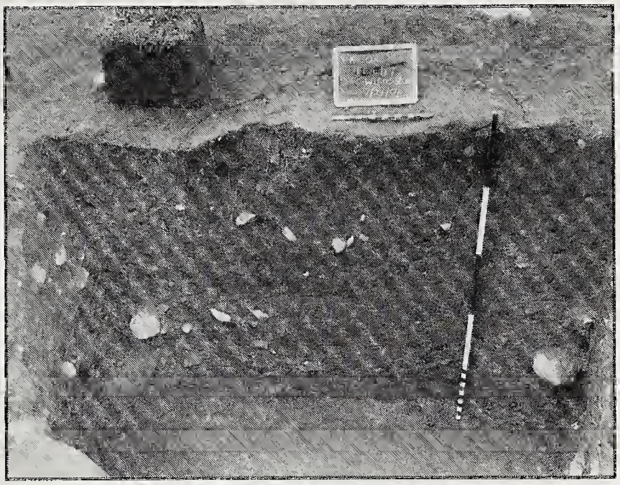

Figure 20. Photograph of a cross-sectioned storage pit, Feature 117. Note the small intrusive pit dug into a previously filled large pit. In both cases the fill displays little stratification.

Time constraints limited the number of features dug to 79, or just 52 percent of the actual total of 153. Of this number, 50, or 33 percent, were identified as storage pits (the category of "pits or hearths" is not included), and these features produced the great bulk of artifacts and food refuse remains. Features that were merely exposed and scraped to define their oral outlines often yielded artifacts or refuse from top levels even though they were not further excavated.

It is interesting to speculate concerning why pits, even very deep pits, are always filled, rather than empty when archaeologists arrive to begin their work. One must presume that when houses and villages were abandoned, no one stayed behind to clean up the living floors and fill the pits to the brim. Many pits must have been only partially filled with stored food or refuse and washed-in soil at the time of abandonment. It is likely that after the houses fell down, the walls of some partially filled pits eventually collapsed from exposure to the elements. But the great majority of pits, as found by investigators, is full of cracked rocks, sand, organic-rich layers, and charred food remains without any sign of collapse. In time the contents settled, forming a surface depression that became filled with humus and leaf litter; these topmost lenses are clearly evident when some pits are cross-sectioned. Depressions marking the tops of storage pits were seen by Harrington (1905) on unplowed areas of the Garoga site. But there is no simple explanation for the observation that storage pits were uniformly filled when excavated by archaeologists.

It is difficult to visualize how people living in houses could continue their normal domestic activities when the pits under the bed lines no longer served for food storage. Families in an incompletely occupied house could move to another place in the house and dig new pits. This would not be an option in a completely occupied house. Perhaps this explains why storage pits are so often located on middle aisles, as well as on bed lines. In full or nearly full houses, one option was to dig new pits in the aisles. This was practiced even though the pits would have posed a hazard to people walking along the aisles. In such cases perhaps the pits were roofed with tree branches and bark covers that could withstand the weight of adult humans. It is very likely that another solution was to dig storage pits outside houses, which would explain the locations of so many pits in the area between Houses 3 and 5, or the area east of House 4.

ARTIFACTS

The Klock site produced an exceptionally large artifact sample. A total of 23,319 artifacts were recovered over the two field seasons. To date, this is the largest professionally excavated artifact assemblage from a Mohawk site. Ceramic artifacts, particularly pot sherds, comprise over half of the collection and lithic, bone, and shell artifacts are well represented. Despite the extensive excavations and the large artifact inventory, no conclusively European trade items were found at the site. A complete trait list is provided in Table 3.

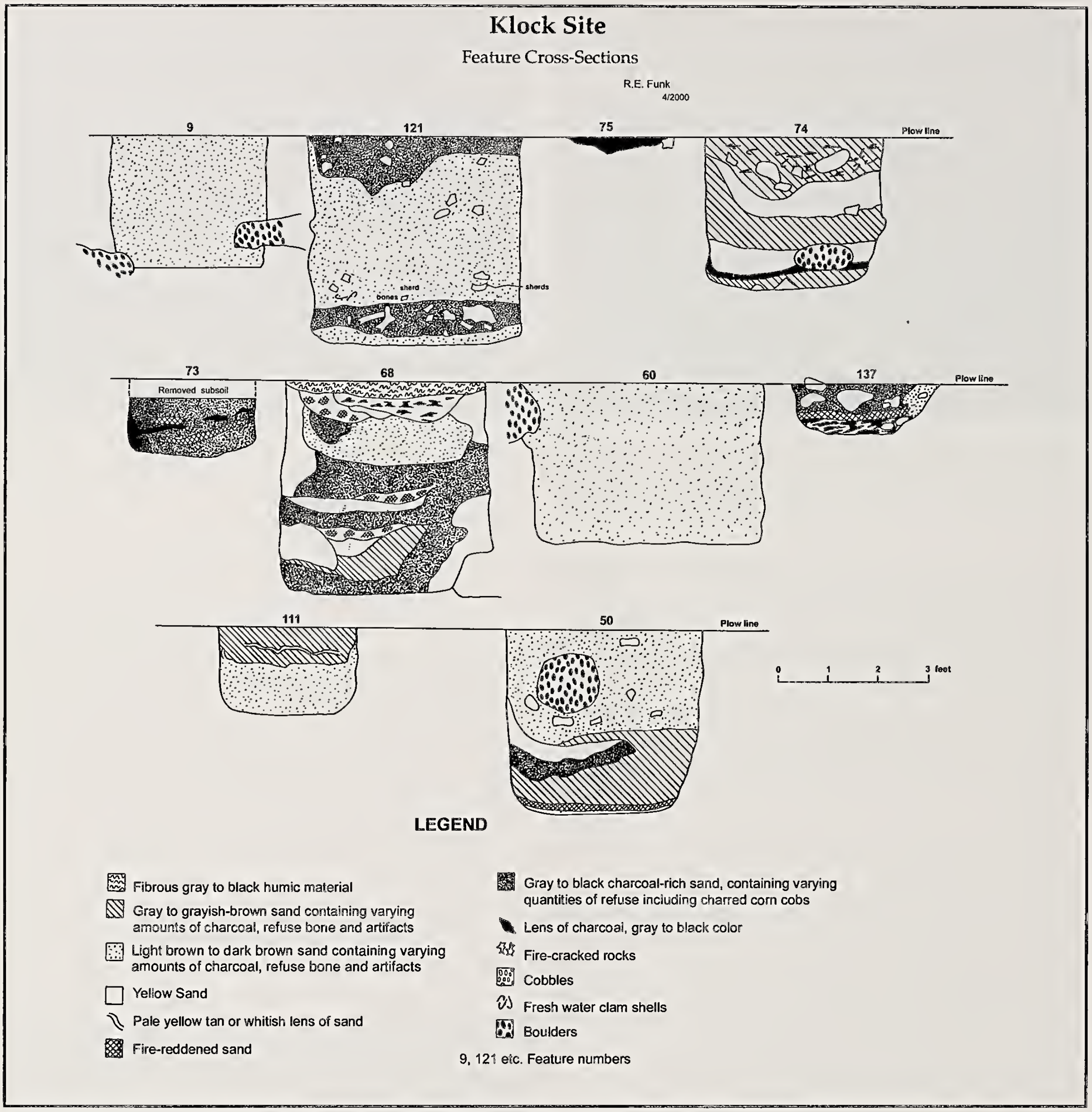
Klock Site
Feature Cross-Sections
R.E. Funk
4/2000
9
121
75
74
Plow line
sherd
bones
sherds
73
Removed subsoil
68
60
137
Plow line
111
50
Plow line
0 1 2 3 feet
LEGEND
Fibrous gray to black humic material
Gray to grayish-brown sand containing varying amounts of charcoal, refuse bone and artifacts
Light brown to dark brown sand containing varying amounts of charcoal, refuse bone and artifacts
Yellow Sand
Pale yellow tan or whitish lens of sand
Fire-reddened sand
Gray to black charcoal-rich sand, containing varying quantities of refuse including charred corn cobs
Lens of charcoal, gray to black color
Fire-cracked rocks
Cobbles
Fresh water clam shells
Boulders
9, 121 etc. Feature numbers

Figure 21: Graphic showing drawn profiles of a sample of cross-sectioned features.

Table 3. Klock Site Trait List

Ceramics	
Pottery	
Complete rim sherds	422
Incomplete rim sherds	2,345
Decorated neck and shoulder sherds	106
Undecorated neck and shoulder sherds	1,387
Plain body sherds	11,762
Check stamped body sherds	75
Juvenile fragments	105
Chunks of fired clay	30

Pipes

Stem fragments	14
Bowl fragments	5
Elbow fragments	2
Juvenile fragments	2

Other

Ceramic disks	2
Ceramic beads	2

Chipped Stone

Projectile Points

Triangular	
Whole	69
Fragmentary	96
Other	
Side-notched	3
Stemmed	1

Other Bifaces

Nondiagnostic biface fragments	13
Knives, ovate or lanceolate	9
Bifaces in process	64

Miscellaneous Chipped Stone

Snook Kill point modified to scraper	1
Biface scrapers	5
Graver? on bifacially modified flake	1
Drill?, fragmentary	1
Piece esquillees?	2
Flaked limestone object	1

Unifaces

Scraper, end	1
Scrapers, side	3
Retouched flake tool	1

Debitage

Cores, flakes (not sorted)	6,349

Rough Stone

Hammerstones, cobble	19
Hammer-anvilstones, cobble	
Single pit	17
Two pits	9
Hammer-anvil-mullers	4
Hammer-abraders	1
Anvilstones, cobble	6
Anvil-muller, cobble	1
Mullers, cobble	1
Abradingstone, cobble	1
Abrader-sinewstone	1
Netsinkers, side-notched	2
Disks, chipped	
Perforated	1
Unperforated	1
Unperforated, side-notched	2
Unperforated, oval, gneiss, not worked	1
Disk fragment? spall, sandstone, showing scratches	1
Celt or pestle? in process	1

Continued on next page

Table 3—Continued

Ground Stone	
Celts, ground and/or polished	29
Polished slate objects	3
Pestles	2
Beads	2

Other Stone	
Quartz crystals (Herkimer diamonds)	108
Fossils	1

Bone and Antler	
Awls, splinter	56
Perforated deer phalanges	50
Bird bone beads	18
Worked beaver incisors	15
Worked or polished bone fragments	10
Antler tine flakers	5
Bone pendants	3
Teeth pendants	3
Bone harpoon	1
Bone fragment with serrated edge	1

Shell	
Discoidal beads	8
Tubular beads	2
Worked shell	1
Shell pendant	1

Textiles	
Cordage	1
Basketry	1

European Goods	
Brass scrap (probably intrusive)	1
Iron scraps (intrusive)	10
Ceramics (intrusive)	4
Kaolin pipes (intrusive)	1
Cut nails (intrusive)	17
Glass (intrusive)	7

Pottery

The most abundant artifacts recovered during excavations at the Klock site were the ubiquitous remains of pottery (Figure 22). More than 16,000 ceramic sherds are present in the collection, representing an indeterminate number of vessels. All of the pottery, with the exception of those fragments attributed to the endeavors of juveniles, was extremely well made. Tempered with a finely ground or crushed agent, this thin-walled ware of globular form was carefully smoothed and wiped, evenly fired at high temperatures, and decorated with a variety of geometric designs on the collared rims and shoulders of the pot. The typical tempering agent was plagioclase feldspar and exotic tempering materials were extremely rare or absent. There were no shell tempered sherds. The curvature of many of the rim and body sherds suggests that many of these specimens were extremely large vessels, possibly used for the storage of food. The large assemblage is remarkably uniform and homogeneous and is representative of the Mohawk Iroquois ceramic tradition during the late prehistoric and early protohistoric periods.

More than 2,700 rim sherds were recovered in the excavations including 422 specimens that were complete from the neck and base of the rim to the lip (Figure 22, Nos. 1, 5, 7–12). The decorative motifs applied to these rims were almost universally executed using the technique of incising and typically included a variety of geometric designs employing horizontal, vertical, and oblique lines, often in filled-triangle or chevron patterns. Bold basal notching, a distinctive characteristic of late prehistoric Mohawk wares, was evident on more than 80 percent of the rim sherds. One-third of the complete rim sherds were castellated. Two rim sherds included a human face effigy between fields of geometric design, but no

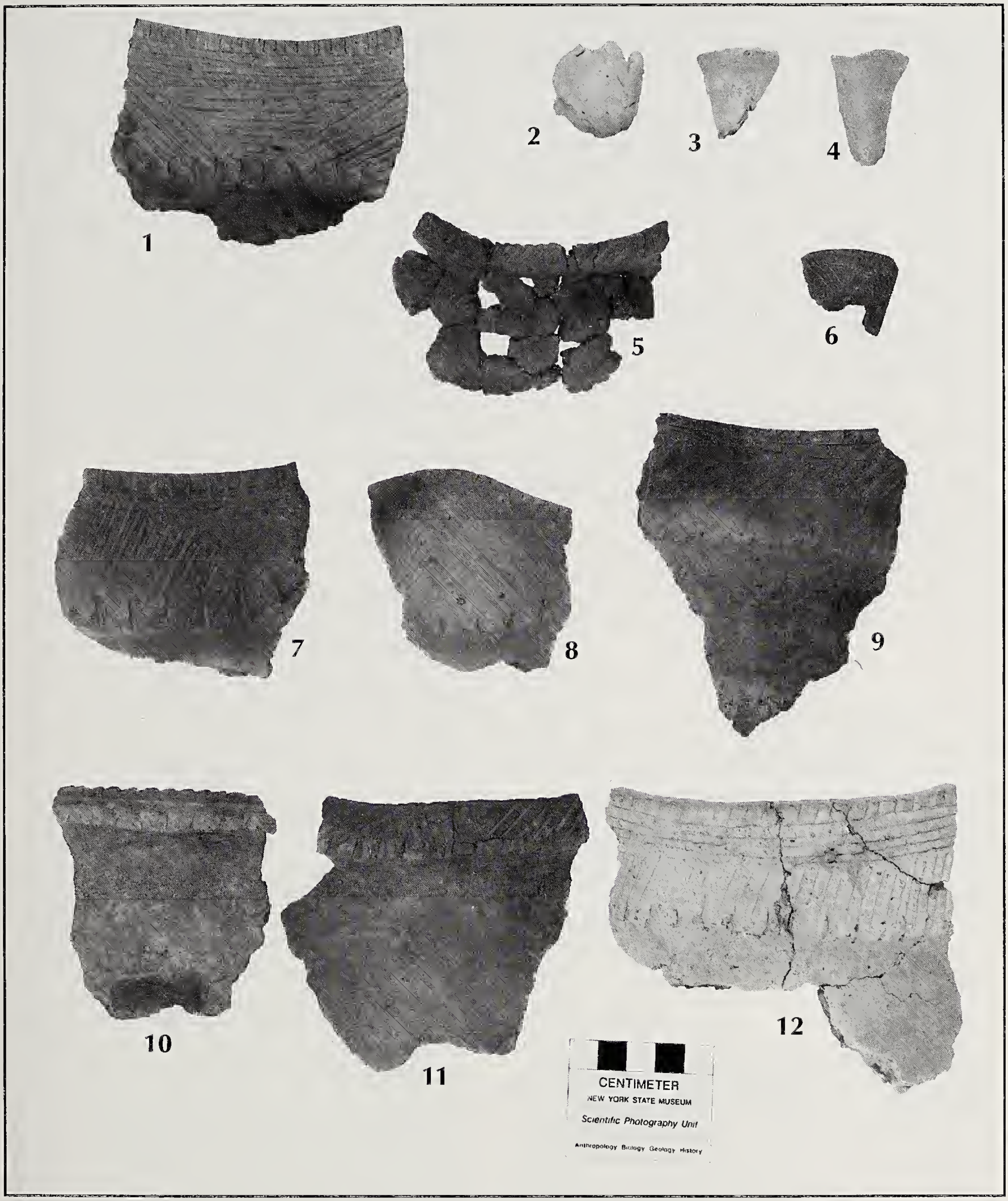
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Figure 22. Photograph of a selected sample of ceramics from the Klock site. Key: 1, 7–9, 12, rim sherds of Garoga Incised type; 2, juvenile vessel body sherd; 3, 4, 6, pipe bowl fragments; 5, 11, rim sherds of Rice Diagonal type; 10, rim sherd of Otstungo Notched type.

other examples of human or animal figures were evident in the pottery assemblage. A single rim sherd displayed a carefully drilled hole, but this was also a unique specimen.

Pottery typology is a useful tool for describing ceramic assemblages. The initial groundwork on Mohawk ceramics was conducted by MacNeish (1952), Ritchie (1952), Ritchie, Lenig, and Miller (1953), and Lenig (1965), who identified and defined a series of temporally diagnostic pottery types and seriated many of the better-known Mohawk components. The pottery types defined by Lenig (1965:5–8) have been used to type the 422 complete rim sherds in the Klock site collection, and the results are presented in Table 4.

Table 4. Klock Site Rim Sherds Listed by Type

Pottery Type		*N*	**% of Total**
Collared	Chance Incised	1	0.2
	Deowongo Incised	20	4.7
	Garoga Incised	241	57.1
	Wagner Incised	27	6.4
	Martin Horizontal	6	1.4
	Cromwell Incised	6	1.4
	Thurston Horizontal	2	0.5
	Other	9	2.1
Collarless	Otstungo Notched	66	15.6
	Rice Diagonal	44	10.4
Total		422	99.8

It is generally agreed that the Klock, Garoga, and Smith-Pagerie sites date to the sixteenth century and represent a single Mohawk village relocating over time within the Caroga Creek drainage (Lenig 1965:66–67; 1977:72); however, Ritchie and Funk (1973:327, 332) noted that the specific order and chronological placement of these three sites remains to be analyzed in detail. Despite the advent of absolute dating techniques such as radiocarbon, seriation of ceramic design motifs is still the most precise relative chronological indicator available to archaeologists working with the Mohawk sequence. A detailed study of site chronology based upon an attribute analysis of pottery from the Klock, Smith-Pagerie, and Garoga sites is presented in the concluding chapter of this monograph.

A large number of sherds representing the neck and shoulder area of globular pots was recognized in the assemblage. All of the pottery shoulders were rounded. Carinated shoulder sherds were completely absent. A small percentage of these neck and shoulder sherds were decorated. Neck decorations were exclusively limited to an occasional vertical or oblique column of short punctates. Shoulder decorations of a number of different types were present. Although many of the decorated shoulder sherds were too fragmentary to categorize with any degree of confidence, a small percentage was large and complete enough to accurately identify, using a typology established by D. Lenig (1965:11). These are listed in Table 5.

Table 5. Klock Site Shoulder Sherds Listed by Type

Motif	*N*	**% of Total**
Incised horizontal banded	22	59
Oblique punctuation	8	22
Incised triangular plats	7	19
Total	37	100

Only one pot sherd in the entire collection was large enough to include a complete rim, neck, and shoulder. The rim of this sherd was a collarless thickened lip variety of Rice diagonal type, the neck was undecorated, and the shoulder was decorated with two horizontal rows of punctates. A larger number of complete rim-to-shoulder sherds would be needed before any meaningful conclusions regarding the correlation of shoulder and rim designs could be made.

Little can be said regarding the large number of body sherds that comprise the bulk of the ceramic assemblage. A small number (< 1 percent) display check stamping, a lingering vestige of earlier Mohawk ceramic traditions, but the vast majority is plain. Nine body sherds show evidence that they were smeared with red pigment. This material was probably derived from hematite, sources of which are known in the Mohawk Valley near present-day Clinton (Wray 1973:26). Pottery treated with red ochre or red pigment has been reported from other Iroquoian sites (Fitzgerald 1982:125; Wright 1986:35), but the meaning behind the use of these coloring agents is unclear.

Numerous sherds show evidence of finger painting, a practice noticed by Tuck (1978:333) and others (Reed 1993:15), and a study of this form of decoration deserves more attention than it has received in the archaeological literature.

Crudely made and poorly fired sherds that are sloppily decorated or left undecorated have been classified as examples of juvenile pottery. Presumably these artifacts represent the first failed attempts on the part of girls or young women to master the craft skills necessary to produce Iroquoian ceramics (Whallon 1969:94). Table 3 notes 105 examples of juvenile pottery fragments. Two of these are very small but complete juvenile vessels that lack decoration. A small and poorly fired clay spoon, presumably a toy, has also been included in this category. The remaining 102 sherds comprise 45 decorated rim fragments, 22 undecorated rim fragments, and 35 plain body sherds. All of the rim sherds attempt to mimic typical Mohawk collared ware except for two examples, which imitate collarless thickened-lip varieties of Mohawk ceramics.

Thirty chunks of fired clay were recovered from the Klock site. Most of these are amorphous globs of wastage that probably accidentally fell into the fire. It has also been suggested that such pieces may have been used to test or experiment with firing temperatures (Ramsden 1989:40). Two examples are long, thin, grit-tempered coils of the kind used in the coiling method of pot construction. Most Iroquoian ceramics appear to have been made by molding, modeling (Ritchie, Lenig, and Miller 1953:18; Ritchie 1954:28), and the paddle and anvil method (MacNeish 1952:7), techniques that were observed among the Huron during the early seventeenth century (Sagard 1939:109). But rare examples of pottery sherds with evidence of coil breaks have been noted in the archaeological literature (Harrington 1909:227; Ramsden 1990a:365), and X-rays of Late Woodland pottery have shown voids demarcating the remnants of coils (Prezzano 1985:126). The presence of unused coils of pottery at the Klock site suggests that the coiling technique of pottery manufacture was not unknown to these people.

Ceramic Pipes

The small sample of ceramic pipes recovered from the excavations at the Klock site comprise 14 stem fragments, all plain, round in cross-section, and undecorated; 5 bowl fragments (Figure 22, Nos. 3, 4, 6); 2 elbow fragments; and 2 juvenile pipe fragments (No. 2). The 5 bowl fragments comprise 1 proto-trumpet bowl, composed of the elbow and part of the stem of the pipe, heavily decorated with opposing oblique incised lines; 3 plain trumpet bowls, 2 undecorated examples and 1 specimen with a motif of alternating horizontal and oblique lines executed with punctates and incisions; and 1 square trumpet bowl, decorated with two horizontal lines between single large punctates on the wide vertical lip edge.

Projectile Points

Some of the most common lithic artifacts recovered at the Klock site were small triangular projectile points manufactured from local cherts. In total, 165 specimens were recovered including 69 complete examples (Figure 23, Nos. 10–12). All of these fall well within the range of variation defined by Ritchie (1971:33–34) for the Madison projectile point type. Descriptive statistics for the sample of complete points are provided in Table 6.

Table 6. Descriptive Statistics for Complete Madison Points from the Klock Site

Attribute	*N*	Mean	Range	Standard Deviation	Coefficient of Variation
Maximum length	69	29.8	17.5–46.0	6.0	20.0
Maximum width	69	16.7	10.5–27.0	3.1	18.4
Maximum thickness	69	5.2	3.0–11.0	1.8	34.6
Maximum weight	36	1.44	1.0–3.0	0.61	42.4

Note: Measurements in millimeters, weight in grams.

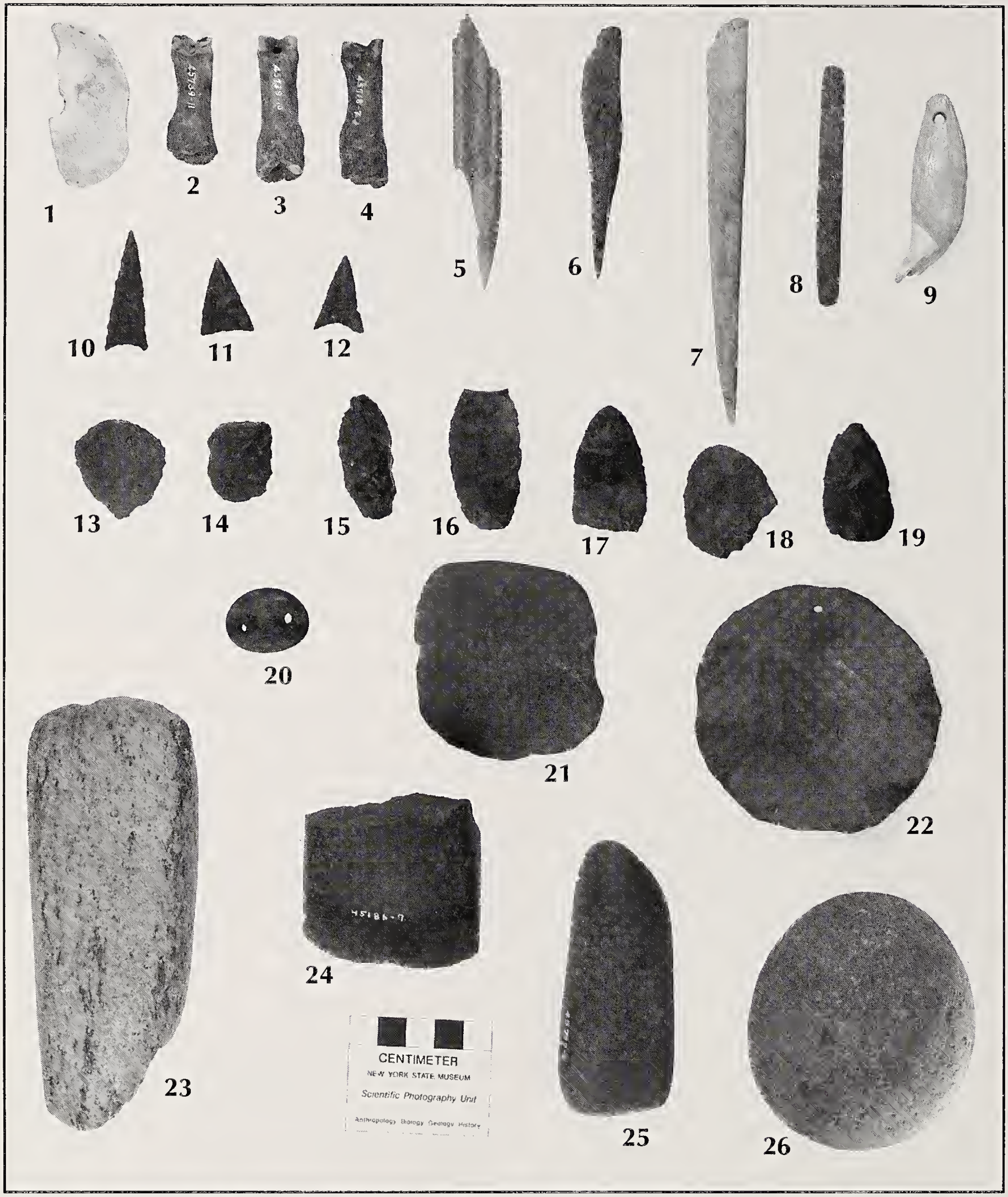
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Figure 23. Photograph of stone, bone, antler, and shell artifacts from the Klock site. Key: 1, fragment of perforated shell pendant; 2–4, perforated deer phalanges; 5–7, bone awls; 8, antler tine flaking tool; 9, perforated bear canine tooth; 10–12, Madison type projectile points; 13, 14, bifacial end scrapers; 15, preform for narrow projectile point or knife; 16, lanceolate biface knife; 17, trianguloid biface knife; 18, 19 ovate biface knives; 20, polished and perforated stone bead; 21, notched cobble disk netsinker?; 22, chipped stone disk with perforation; 23, 24 ground and polished celts; 25, cobble hammerstone; 26, cobble anvilstone. Lithic materials: 10–19, central Onondaga chert; 20, soapstone; 21, 22, siltstone; 23, gneiss; 24, graywacke or slate; 25, quartzite; 26, sandstone.

The average maximum length for the projectile points was 29.8 millimeters, and the average maximum width was 16.7 millimeters. The assemblage is relatively homogeneous with respect to these attributes, as indicated by the low coefficients of variation. The coefficient of variation is a percentage, based on the mean and standard deviation, which serves as a measure for comparing the relative degree of variation in different attributes or samples. In general, a coefficient of 20 or less indicates a relatively homogeneous sample. In contrast to the length and width statistics, the maximum thickness and weight of these projectile points were characterized by greater heterogeneity, as indicated by the high coefficients of variation. For a discussion of statistical trends in Mohawk projectile points, see Kuhn (1996).

Nominal characteristics for projectile point side and base shape are presented in Table 7. Concave bases are the dominant form, although straight bases occur with some regularity. Convex examples are rare. Basal thinning is evident on the vast majority of the points, and this thinning process may be the principal reason for the typical concave basal shape. The sides of these points are most often straight, although both excurvate and incurvate examples are represented in the sample.

Table 7. Base Shape and Side Shape Attributes for the Klock Site Projectile Points

Base Shape	% of Total	Side Shape	% of Total
Concave	80	Straight	83
Straight	19	Excurvate	9
Convex	1	Incurvate	7
		Irregular	1

A relatively small number (15) of triangular points showed signs of use-wear or other modification. Five specimens lacking the tip show evidence of impact fractures. In four other cases, the bases were slightly rubbed or ground, presumably to facilitate hafting. Two of these points display additional wear; one has a heavily blunted and rounded tip, suggesting its use as a drill, and the other also has a heavily blunted and rounded tip plus very heavy rounding/gloss on both edges, also indicating use as a drill and/or knife. Of the remaining six specimens, one point may have served as a drill, because it shows attrition in the form of tiny flakes pressed off the somewhat blunted tip. Two points display smoothing and rounding/gloss on the face and edge near the tip, and a third shows rubbing on one lower lateral edge. Finally, two points were retouched on the edge to create short scraping areas.

Because the projectile points from the Klock site display a tight uniformity, it is worth commenting on some of the more unique specimens. Of particular interest is one triangular point that has a small but distinctive natural quartz inclusion near the tip. The significance of crystal in Iroquois ideology has been discussed by Hamell (1983). It is clear that this medium was symbolically equated with supernatural power. The value of chert, particularly as a material of considerable significance in hunting and warfare activities, was equally recognized by the Mohawk "people of the flint." The intersection of these two "symbolically charged" materials in a single projectile point may have imbued the artifact with enhanced animistic power. A similar projectile point with a quartz inclusion was discovered during excavations at the Mohawk Otstungo site by a University at Albany, SUNY, field team.

Four other projectile points found at the Klock site include three side-notched and one stemmed specimen. One of the side-notched points resembles the Brewerton Side-Notched type (Ritchie 1971:19–20) in shape, size, and the grinding on the base. Kuhn proposes that these ancient projectile point types were discovered and saved by the Mohawk occupants of the site. Often referred to as curios or keepsakes, these items are probably better understood as fetishes; they were probably imbued with magical power because of their unusual characteristics and/or association with the ancestors. The occurrence of such items on Mohawk sites is not unusual. Two side-notched points were found during excavations on the Garoga site (Ritchie and Funk 1973:328), and an unusual Paleoindian fluted point was also found in a deep midden at the Elwood site (Snow et al. 1985:13). Similar finds of antiquated point forms, identified as curios or charms, are known from other Iroquoian sites as well (Trigger 1990:38–39; Von Gernet 1982:54–55). A small fossil found in context at the Klock site might also fall into the category of magical fetish. Pre-Iroquoian projectile points, coral, and fossils have been found in the ceremonial charm kits that sometimes accompany Seneca Iroquois burials (Wray 1957:27, 1973:26). Funk, however, offers what seems to him a more probable interpretation of these early point types from the Mohawk sites, believing most or all of them to be the result of older, pre-

Iroquoian visits to the site locales by hunting and gathering parties or individuals. In his opinion the keepsake or fetish hypothesis needs to be supported by the discovery of these artifacts as clear mortuary furnishings or in medicine bundles, which has not been shown for the sixteenth-century Mohawk sites.

Other Chipped Stone Artifacts

More than 6,500 chipped stone items other than projectile points were recovered from the Klock site. The vast majority of these (6,349) was fragments of chert cores and flakes resulting from the chert-knapping process. Following are descriptions of bifaces, scrapers, and unifaces. No attempt was made to sort out utilized flakes from the thousands of pieces of debitage in the collection.

Biface Fragments

These 13 items are not classifiable as either points or knives and could not be assigned a place in the chert reduction sequence. One of these items showed Level-2 rounding/gloss and edge crushing on a portion of one edge.

Knives, Bifacial

These nine objects are mostly fragmentary, and only one bipointed specimen resembles the classic "Iroquois knife." Otherwise they are of either ovate or lanceolate form (Figure 23, Nos. 16–19). They are distinguished from projectile points chiefly on the basis of a lack of basal hafting elements and the relative breadth of blade. Despite this classification, none of them showed clear signs of use in the form of edge rounding, gloss, striations, edge crushing, and so forth. Whole specimens ranged from 42 to 59 millimeters in length. The group ranged in width from 21 to 40 millimeters and in thickness from 6 to 13 millimeters.

Bifaces in Process

Classified as Stage 1 or Stage 2 in the reduction process, these 64 objects are largely fragmentary. The 16 complete specimens ranged from 32 to 76 millimeters in length (Figure 23, No. 15). The group as a whole ranged in width from 18 to 70 millimeters and in thickness from 6 to 30 millimeters. Evidence of use-wear was noted on just one specimen, and consisted of a heavily blunted and rounded tip that may have resulted from drilling.

Biface Scrapers

The six objects in this category manifest at least one broad end showing deliberate, steep retouch flaking that produced a scraping edge. One based on a reworked Snook Kill point, with broad blade and contracting broad stem, is whole, measuring 45 by 33 by 10 millimeters with a hafting width on the stem of 19 millimeters. The other items are ovate in outline (Figure 23, Nos. 13, 14) and measure 28 by 25.5 by 8.8 millimeters, 28 by 23 by 9.6 millimeters, 36 by 25 by 10 millimeters, and 34 by 33 by 12 millimeters, weighing 8, 7, 10, and 12 grams respectively. The broken item is missing the tip and measures 27 millimeters wide, 11 millimeters thick. Most are representative of early stages in the biface production process and got "sidetracked" along the way for a different function than originally intended.

Only two of the ovate objects show signs of use-wear. One shows light (Level-1) rounding/gloss on the broad, retouched end. The other (Figure 23, No. 13) shows slightly heavier (Level-2) rounding/gloss and striations on the narrow, unretouched, end.

Drill?

A narrow, thick triangular object, nearly whole with just the tip missing, is reminiscent of a drill, although no evidence of wear was seen under magnification. It has a slightly indented base and may actually represent a Madison point in an early stage of reduction. It measures 36 millimeters long, 12 millimeters wide, and 6 millimeters thick.

Pieces Esquillee?

One of these two items appears to be an "exhausted core" or "wedge," not a standard biface, with bipolar flaking on opposite ends. It measures 33 by 18 by 9.6 millimeters and weighs 7 grams. The other is a rude, squarish, core-biface on a chert nodule, displaying much heavy battering on all edges. It measures 27 by 29 by 10 millimeters and weighs 10 grams.

Graver?

An odd piece based on a thin flake. The edges are bifacially flaked but the scars do not extend to the middle of the flat faces. The flaking has created a well-defined, sharp tip, but no wear is apparent on this object. It measures 33 by 20 by 3 millimeters.

Flaked Limestone Object

A large, rudely chipped, ovate piece of shaly limestone. This piece shows bifacial flaking along the edges and considerable wear in the form of rounding and blunting on the broad ends. It measures 94 millimeters long, 64 millimeters wide, and 22 millimeters thick. It weighs 116 grams.

Unifaces

Only five items were definitively assigned to this category. One is an end scraper, on a flake but missing the basal portion and striking platform. The broad end opposite the striking platform was retouched to semicircular form. The bit is 27 millimeters wide, the thickness is 8 millimeters. Viewed from the dorsal face, the left side of the bit shows heavy (Level-3–4) rounding/gloss and striations on the underside. Three side scrapers are on elongate flakes, missing the striking platforms. In each case one long edge is steeply retouched. On one item, measuring 35 by 29 by 8 millimeters and weighing 8 grams, the same edge is slightly retouched on the opposite face, and the edge shows possible use-wear as slight rounding/gloss. On another item, measuring 40 by 20 by 7 millimeters and weighing 5 grams, the opposite edge shows short (13 mm) retouch on the same (dorsal) face, and the edge displays possible edge crushing. The third side scraper measures 29 by 19 by 12 millimeters, but there is no apparent use-wear.

The last uniface to be described is classed as a retouched flake, not an end or side scraper. It shows retouch on the broad end, but there is no evident wear. Size is 54 by 37 by 8 millimeters, and it weighs 17 grams.

CHERT SOURCE MATERIALS

The vast majority of chipped stone artifacts at the Klock site were manufactured from locally available gray central Onondaga and Esopus chert. Most of the known outcrops for these materials are located 15 to 25 kilometers south of the Mohawk River. They are part of a number of broad east-west-trending formations that extend across the central tier of the state.

Some small numbers of other types of chert are present in the lithic assemblage. Knauderack chert is represented by 22 artifacts including 1 incomplete projectile point. Outcrops of this poor-grade chert are located a few kilometers east of the Klock site. This chert ranges in color from light blue to white and is usually speckled with oolitic inclusions. Ten examples of eastern Onondaga chert, including 1 complete projectile point, are represented in the assemblage. This chert is a glossy, speckled, deep blue material available from outcrops in the Onondaga formation.

Long-distance exotics include two types. The first category is represented by 12 pieces of glossy or milky white chert. The source or sources of this material have not been conclusively identified, but these specimens may be Lockport chert from southeastern Ontario. The second category includes 4 flakes of green Normanskill chert from the mid-Hudson Valley.

The presence of Normanskill cherts suggests that the residents of the Klock site had access to regions to the east. Possible Lockport cherts suggest interaction with the northwest. The absence of exotic cherts from the south suggests little contact with these regions. When it is considered that exotic materials comprise less than 0.25 percent of the lithic assemblage, it must be concluded that Mohawk procurement strategies were extremely localized and relied little upon materials acquired from long distances.

ROUGH STONE ARTIFACTS

The Klock site assemblage includes a large number of rough stone tools that were used for pounding, chert knapping, mealing, and other domestic activities. The most common were hammerstones and hammer-anvilstones made from water-worn or glacially deposited cobbles. The breakdown of these cobble tools, 60 in all, relies on the presence, or absence, of pits and abraded surfaces on the flat surfaces and edges of the cobbles.

Of these tools the great majority was based on cobbles that were oblate spheroidal to near-discoidal in shape. In nearly all cases these shapes were natural in origin, but in at least one case some degree of intentional modification is evident. The discoidal or spheroidal shape determines the descriptive terminology used here. The "polar" surfaces are the flattest on the cobbles and therefore are called the "faces." The "equatorial" regions are relatively narrow and are referred to as the "edges." Indeed the shape of the cobble was highly suited to the grasp of the human hand.

The 19 items classified as hammerstones lack pits on the faces, but all show varying degrees of pitting or battering on the edges (Figure 23, No. 25). The damage or scarring range from barely discernible small pits or grooves to heavy step-flaking and even the removal of large chunks of the tool.

The 26 objects classified as hammer-anvilstones bear pitting on both the faces and the edges. The pitting on the faces and edges is, once again, highly variable but mostly seems to be from the same cause, namely, pounding or battering. But in certain cases the pitting on the faces seems to have been produced by a different process, resulting in oval or circular, basin-shaped depressions. The method may have been to gouge out or grind out the depression. Thus some of these bipitted tools may not have actually functioned as both hammers and anvils, but as hammerstones on which pits were deliberately produced to aid the grasp of the user.

The six objects identified as anvilstones bear battered or pitted surfaces on the faces, but lack pitting on the edges (Figure 23, No. 26).

Hammer-anvil-mullers, four in number, have the expected pitted surfaces, but in addition one or both faces were ground flat, probably by use with milling or mealing slabs used in grinding corn, nuts, or seeds. The faces show both polish and striations.

One tool lacks pitting but has a ground "mulling"surface and is called a muller. Another is an abrader (showing a beveled or ground surface from use as a whetstone).

Other combinations include an anvil-muller, a hammer-abrader, and an abrader-sinewstone (showing not only an abraded surface, but also a series of narrow grooves along the edge usually attributed to sizing sinew).

Of six disk-shaped objects in the collection, four qualify as the objects that are familiar to archaeologists working with northeastern late prehistoric and early historic sites. Those four are round, based on flat siltstone cobbles, and flaked along the edges. Two of the complete specimens are 86 millimeters in diameter, and 14 and 15 millimeters thick. The weights are 92 and 86 grams, respectively; one displays a single small perforation near one edge (Figure 23, No. 22). Two others are not only discoidal but shallowly side notched. One is 69 millimeters in diameter and 11 millimeters thick and weighs 69 grams (Figure 23, No. 21). The other is broken, about 80 millimeters in diameter. All of the objects display heavy rounding and blunting, even grinding, on the edges, perhaps from use in some task that remains to be understood. Use as hoes or digging tools seems to be precluded by experimental studies (Lindner 1983). The two side-notched items may have served as netsinkers. A fifth item is similar in size and shape, the material is gneiss, but there is no evidence of deliberate flaking or use-wear. It measures 82 by 76 millimeters and is 15 millimeters thick. A sixth object is a siltstone spall, not deliberately flaked, which bears scratches on the rind (cortex).

One item may be a pestle, in process. It is of metagabbro and very roughly pecked preliminary to final shaping.

The materials used for the rough stone tools are predominantly sandstone and quartzite. Metamorphic rocks, gneiss and metagabbro, were used less often in all the categories. It is noteworthy that all the tools with an abrading function are made of either sandstone or siltstone. It remains uncertain why the chipped disks are all of siltstone. Three similar examples are known for the Garoga site, but this artifact type appears to be absent on earlier components in the Mohawk Valley. Similar types of stone disks occur with greater frequency on sixteenth-century Onondaga sites (Bradley 1987:41, 64). However, these are usually of slate and are often perforated. Examples from Mohawk sites do not share these characteristics.

With the exception of broken specimens, the cobble tools were weighed to facilitate comparisons between different rough stone categories within the Klock assemblage, as well as comparisons among assemblages from different sites. The intent is also to provide possible clues to optimal weights of these tools for their use in various tasks. Statistics for hammerstones, hammer-anvilstones, hammer-anvil-mullers, and anvilstones are provided in Table 8. Samples for the hammer-anvil-mullers and anvils are small but permit tentative comparisons with the other tool types. It is clear that hammers, averaging 467 grams apiece, tend to be lighter than hammer-anvils and hammer-anvil-mullers, which average 786 and 770 grams, respectively. The higher weights for hammer-anvils might be hypothesized to be the result of a need for stable platforms during such activities as quartering of chert cobbles, breaking of food bone, pulping of wood and bark, and other heavy work. Hammers, on the other hand, need to be lighter in order for the average person to manipulate them without too much effort. This notion seems contradicted, however, by the average weight of anvilstones, which is only 509 grams, but the sample consists of only 6 items compared with 19 hammerstones and 26 hammer-anvilstones.

Table 8. Summary Statistics for the Weights of Hammerstones, Hammer-Anvilstones, Hammer-Anvil-Mullers, and Anvilstones from the Klock Site

Statistic	Hammer-Stones	Hammer-Anvils	Hammer-Anvil-Mullers	Anvilstones
Mean	467	786	770	509
Median	415	812	678	431
Mode	N/A	N/A	N/A	N/A
Standard deviation	293	329	456	240
Range	1,222	1,126	1,233	667
Minimum	114	240	161	287
Maximum	1,336	1,366	1,394	954
N	19	26	5	6

Note: Weights in grams.

GROUND STONE ARTIFACTS

Celts also occurred frequently at the Klock site (Figure 23, Nos. 23, 24). Of the 29 examples, 20 were fragments, 6 were complete, and 3 were unfinished celts discarded before the manufacturing process was completed. Five of the complete celts were squarish in cross-section with a ground bit at one end and a flat butt at the other end, which was almost always extremely battered. A single example was double ended with a bit at each end. Most of the 29 celts retained the surface pitting and grinding characteristic of the manufacturing process; however, 3 were additionally polished to create a smooth surface finish. All but 4 of the celts were produced from granitic materials. Of the 4 anomalies, 1 was of red slate, 1 of greenstone, 1 of diorite, and 1 of a lithic material not yet identified.

A doubly perforated stone bead, possibly of soapstone, was recovered (Figure 23, No. 20). Other polished stone objects include a bead and three slate fragments.

BONE AND ANTLER ARTIFACTS

Bone and antler artifacts occurring at the Klock site were represented by a variety of cutting, scraping, perforating, and stone-working tools. Most common were small polished and pointed awls of which 35 complete specimens and 21 broken fragments were recovered during excavation (Figure 23, Nos. 5–7). Worked beaver incisors with a ground edge on the lingual surface were the second most abundant tool in the assemblage, as they were at the closely related Garoga site. These incisors would have been hafted. For example, Ritchie (1944:122, 124) illustrates beaver incisors hafted in a section of antler beam from the Avon and Fall Brook sites. They were likely used as chisels for carving wood (Jamieson 1993:52), as Sagard ([1632] 1939:234) described. Other bone tools in infrequent amounts included 5 antler tines with heavy, faceted ends undoubtedly used for flint knapping (Figure 23, No. 8); 1 bone fragment with a serrated edge possibly used as a cutting tool; and a single bone harpoon. Although relatively uncommon on Mohawk sites, bone harpoons have been reported for the Garoga and Cayadutta sites (Ritchie and Funk 1973:329; Hagerty 1985:237).

Nonutilitarian bone artifacts occurred with some frequency at the Klock site. Although they may have had functional uses as toggles, counters, or gaming pieces (Jamieson 1993:54-54), it seems likely that the numerous perforated deer phalanges from the Klock site served as ornaments (Figure 23, Nos. 2–4). The bird bone beads and bone and teeth pendants present in the assemblage also represent ornamental artifacts that served in the same capacity as personal adornment. Most show evidence of the cutting, grinding, drilling, and polishing that comprised the manufacturing process. Bird bone beads were the most common item, after the ubiquitous drilled phalangeal cones. Many of the beads were small fragments, but seven complete specimens, highly polished at both ends, were included in the assemblage.

These complete examples ranged in length from 20 to 47 millimeters, with an average length of 33 millimeters. The size distribution is similar to that reported from other Iroquoian sites (Ramsden 1989:46). Three bone pendants and three teeth pendants, one a drilled and polished bear canine (Figure 23, No. 9), apparently beads-in-process, were recognized among the refuse bone when that collection was analyzed. These are described together with the other floral and faunal remains.

SHELL ARTIFACTS

Twelve marine shell artifacts were discovered during excavations at the Klock site: eight discoidal beads, two tubular beads, one broken pendant (Figure 23, No. 1), and one piece of worked marine shell. All of these artifacts were of white shell except for three of the discoidal beads, which were manufactured from purple shell. These three specimens represent the earliest occurrence of purple shell on Mohawk sites. For comparison, the earliest occurrence of purple shell on Seneca sites is at the Richmond Mills site, dated ca. 1540 to 1560 (Ceci 1985:8). The flat discoidal beads ranged in diameter from 5 to 10 millimeters, with an average diameter of 7.5 millimeters. All were between 1 and 3 millimeters thick. The two native-drilled tubular beads were 5 and 6 millimeters in length, respectively. Both were highly polished. The tubular beads fall within the range of what has traditionally been classified as wampum. These two beads represent the earliest occurrence of true wampum on Mohawk sites. For a discussion of trends relating to marine shell artifacts on Mohawk sites, see Kuhn and Funk (1994).

TEXTILES

The preservation of cordage and other woven goods manufactured from organic materials is very rare on archaeological sites in the Northeast. One small piece of cordage, fortuitously charred but not completely burned, was recovered at the Klock site. In addition, a small, finely woven fragment of an unidentified article was preserved. The fibrous material of the latter is suggestive of the splint basketry known to have been produced by the Iroquois during the colonial period. Given the rarity of such finds and the lingering debate over the origins of basketry technology among the Iroquois (Bardwell 1986) , these specimens deserve the attention of experts in botany, twining, and basketry.

EUROPEAN GOODS

The only possible European trade piece from the Klock site is a single small scrap of brass recovered from the plow zone during the excavations. Most trade goods are recovered from burial contexts on protohistoric-period Iroquois sites, so the absence of these materials in the Klock site village and midden areas is not surprising. Lenig (1977:78) has recorded the presence of a single artifact of European origin from his excavations at the Klock site.

Some confusion has been engendered over the years by a newspaper report stating that a glass trade bead was found at the Klock site. The *Amsterdam Recorder* printed a short article (with photographs) on August 22, 1969, about the New York State Museum excavations at the site. The article reported the discovery of a tiny glass bead. This was a misidentification; when the collection was curated at the museum the bead was identified as a shell bead in the Klock site catalog. The junior author has examined the artifact and the feature records. The bead reported in the *Amsterdam Recorder* as glass is, in fact, a shell bead. No European trade bead was discovered at the Klock site.

Intrusive materials recovered from the plow zone of the Klock site included 17 cut nails, 7 fragments of bottle glass, 4 pieces of historic ceramics, 1 kaolin pipe stem (5/64-in bore diameter), and 10 scraps of iron. The ceramics include late-eighteenth-century pearlwares and stonewares. All of these materials postdate the Mohawk occupation of the site. Most of these materials were probably deposited at the site during the nineteenth century when the area was extensively farmed.

SUBSISTENCE REMAINS

Thousands of charred corn kernels and cobs were recovered during excavations at the Klock site. A small number of charred squash seeds are also present in the site collection. These remains testify to the horticultural nature of the Mohawk subsistence strategy. A small sample of fresh-water shell and charred nut shells indicate that the site inhabitants also supplemented their diet through gathering activities. A large sample of animal bone indicates that hunting was a common occupation.

A preliminary analysis of the faunal remains was completed by Susan Eigen (1984, 1986), and the results of her work are presented in Table 9. Most of the more than 3,000 analyzed pieces of refuse bone came from the numerous intact features that were discovered at the site. The majority of the features contained some bone fragments, many of which had cuts, scratches, and breakage indicative of butchering. Examples of burned bone were also very common. Most features contained bones that displayed evidence of gnawing and chewing by nonhuman scavengers; small rodents and larger carnivores (probably dog). The contents of a few features were far more "ravaged" than most; the bones of some features showed no sign of scavenging at all. The distribution of such features might provide information on the timing of intrasite areas of use and abandonment; such an analysis has not yet been conducted.

Table 9. Klock Site Faunal List, Analysis by Susan Eigen

Species	Pieces	MNI[a]
Cervus Canadensis	1	1
Alces or Cervus (moose or elk)	4	
Odocoileus virginianus (white-tailed deer)	2,634	52
Ursus americanus (black bear)	93	5
Ursus americanus (black bear) (probable)	1	
Lynx rufus (bobcat) (probable)	1	1
Canis familiarus (dog) (probable)	133	8
Canis familiarus or *lupus* (dog or gray wolf)	11	1
Procyon lotor (raccoon)	14	2
Martes americana (pine marten) (probable)	2	1
Martes pennanti (fisher) (probable)	12	1
Martes sp. (marten or fisher)	10	2
Sylvilagus sp. (rabbit)	1	1
Sylvilagus or *Lepus* (rabbit or hare)	1	
Castor canadensis (beaver)	328	9
Marmota monax (woodchuck)	21	5
Marmota monax (woodchuck) (probable)	1	
Ondatra zibethicus (muskrat)	3	1
Sciurus carolinensis (eastern gray squirrel)	1	1
Sciurus sp. (squirrel) (probable)	1	
Sciurud (not woodchuck, member of squirrel family)	3	
Tamias striatus (eastern chipmunk)	12	4
Tamias striatus (eastern chipmunk) (probable)	1	
Blarina brevada (shorttail shrew)	1	1
Vole species	2	1
Peromyscus leucopus (mouse)	1	1
Cricetidae (mice, rats, lemmings, voles)	3	
Cricetine (rodent)	1	
Homo sapiens (human)	3	1
Branta canadensis (Canada goose)	15	2
Branta canadensis (Canada goose) (probable)	2	
Meleagris gallopavo (wild turkey)	1	1
Meleagris gallopavo (wild turkey) (probable)	1	
Anatidae (waterfowl family, probably duck)	1	1
Testudines (land or fresh-water turtle, not snapping)	P	1
Ictaluridae (catfish)	15	7
Catostomus sp. (sucker, probably white)	1	1
Perca sp. (perch) (probable)	1	1
Bufo sp. (bullfrog)	5	2
Rana sp. (frog)	2	1
Rana sp. (frog) (probable)	1	
Bufo or Rana	23	6
Total	3,368	122

[a] MNI = minimum number of individuals.

A minimum of 121 animals were represented at the Klock site, including birds, fish, turtles, amphibians, and a wide variety of mammalian species. The diversity of the faunal list suggests that virtually every and any type of game was exploited by the site's inhabitants. At the same time, it is also clear that most of the hunting efforts must have focused primarily on the taking of deer. White-tailed deer was the most common species represented in the faunal assemblage, comprising 78 percent of the identified pieces of bone. No other single species exceeded even 10 percent of the assemblage. White-tailed deer was one of the largest and most abundant game animals in the region; the 52 deer represented in the faunal sample could have provided 4,000 to 5,000 pounds of edible meat. Edible meat figures for the entire faunal assemblage, calculated by a variety of methods, ranged from 6,200 to 7,200 pounds.

Human remains recovered from features included six charred parietal fragments and a deciduous upper right primary incisor that had been lost naturally, as the permanent tooth erupted. It is likely that the tooth was discarded, directly or indirectly, into the feature. The tooth has one carious lesion on the lateral side and one area of probable etching by acids associated with calculus at the juncture of tooth and root. The parietal bones have no signs of butchering and so cannot be interpreted as evidence of conflict or ritual cannibalism.

The paucity of scattered fragments of human remains in Mohawk village areas is notable and contrasts with comparable sites in southeast Ontario, where these types of remains occur with greater frequency (cf. Reed 1993:36–37). This contrast is probably a reflection of the different burial practices prevalent among these Iroquoian groups. The Ontario Iroquoians traditionally prepared secondary burials in accordance with the Feast of the Dead ritual, and the exhumation of primary burials and bundling of skeletal materials could have led to occasional deposition of small human bone fragments within the village. As the New York Iroquoians practiced primary interment, human bones would not have entered the archaeological record through this process.

A number of pieces of worked bone were identified during the faunal analysis. One of the probable waste bits is the anterior end of a deer mandible, grooved and snapped just behind the large mental foramen, perhaps during a bead making process. Another possible bead stock is a right fifth metacarpal from *Ursus americanus*. The final piece is a first phalanx from *Odocoileus virginianus*, which has had a hole cut and abraded into its distal end. The piece is similar to those used in the Iroquoian cup-and-pin game.

Since Eigen's study, further faunal analysis was conducted by Matt Kirk (1996), graduate student in anthropology at the University at Albany, SUNY. Prior to their studies, a limited sample from several pits was analyzed by Charles Fisher (1977). Kirk's results were, as might be expected, very similar to Eigen's (and Fisher's), but there were differences in analytical methods, in the sample sizes, and in species identified. Eigen had the entire faunal collection available to her but reported on a total of just 3,368 bones. Kirk's study was based on the remains from only 21 features, but he listed 4,564 bones. One would expect a far larger count from the complete assemblage. The seeming discrepancy is probably resolved with the realization that Eigen was unable to complete her analysis and clearly states that her report is preliminary. Also her list does not include unidentifiable scraps of bone, such as "large mammal," which Kirk's does, and this would considerably reduce the number stated for her sample.

Kirk and Eigen both looked at bone counts, minimum number of individuals (MNI), and caloric value of important animal species. Kirk also used measures of diversity and equitability. Their lists of identified taxa overlap, but Kirk reports red fox (*Vulpes fulva*) and river otter (*Lutra canadensis*), both lacking from Eigen's list, whereas Eigen identified dog (*Canis familiaris*), possible wolf (*Canis lupus*), woodchuck (*Marmota monax)*, bobcat (*Lynx rufus*), muskrat (*Ondatra zibethicus*), Canada goose (*Branta canadensis*), catfish (*Ictaluridae*), sucker (*Catostomus* sp.), and perch (*Perca* sp.), none of which were reported by Kirk. Also missing from Kirk's list is human bone, which as mentioned above was definitely present in Eigen's sample and also reported by New York State Museum physical anthropologist Brenda Baker.

Both Eigen and Kirk noted the great predominance of deer in the fauna, and the relatively high representation of beaver. Kirk points out the low diversity index and the relatively high equitability index for the Klock site. He calculated MNI for mammals only, for a total of 33. The data, from his Table 4, are presented here in Table 10.

Table 10. Klock Site Faunal List, Analysis by M. Kirk

Taxa	MNI[a]	% of Total
Castor canadensis	4	12.12
Lutra Canadensis	1	3.03
Martes Americana	1	3.03
Odocoileus virginianus	15	45.45
Procyon lotor	1	3.03
Rodentiae	2	6.06
Sciurus sp.	2	6.06
Sciuridae	2	6.06
Sorex sp.	1	3.03
Ursus americanus	2	6.06
Vulves vulves	2	6.06
Total	33	100

[a] MNI = minimum number of individuals.

The faunal assemblage from the Klock site is very similar to that from the closely related Garoga site. Mammalian species comprise over 95 percent of the identified bone remains from both sites with white-tailed deer the most important and abundant of that class. As at Garoga, beaver represented a higher proportion of the refuse bone at Klock than any other species except deer, supporting the idea that the fur trade was becoming increasingly important to the Iroquois at this time (Ritchie and Funk 1973:329; Lenig 1977:73–74; Kuhn and Funk 2000). Other species, such as dog and bear, were also important at both sites.

The only mammalian species identified at the Klock site that was not also represented in the Garoga site faunal assemblage was bobcat. *Lynx rufus* is exceedingly rare in late prehistoric period assemblages in New York State and has been recorded for only one other Mohawk site: the Nahrwold No. 1 site located along Schoharie Creek (Ritchie and Funk 1973:290). It seems likely that this type of game was only exploited opportunistically. It certainly was not a significant component of Mohawk dietary sustenance. Mammalian species present at the Garoga site but absent at Klock included gray fox (*Urocyon cinereoargenteus*), and porcupine (*Erithizon dorsatum*).

For a detailed discussion of broad trends in Mohawk faunal assemblages and subsistence patterns, see Kuhn and Funk (2000).

RADIOCARBON DATES

Table 11 lists the presently available radicarbon dates for the Klock site. The AA-6418 and AA-7404 dates were reported by Snow (1995:171) and the A-0326 date was reported by Hart, Thompson, and Brumbach (2003). All were obtained by the accelerator mass spectroscopic (AMS) method.

Table 11. Radiocarbon Dates for the Klock Site

Lab Number	Material	Date (yr B.P.)	Calibration[a]
AA-6418	Zea mays	315 +/- 60	1483 (1527, 1560, 1631) 1649
AA-7404	Zea mays	520 +/- 75	1326 (1415) 1439
A-0326	Zea mays	317 +/- 38	1492 (1527, 1553, 1632) 1656

[a] 1 sigma (mean[s]) 1 sigma

Given the limited precision of radiocarbon dating and the large 1-sigma ranges of these dates, they add little to our understanding of the Klock site chronology. Nevertheless, the A.D. 1560 mean of the AA-6418 date and the A.D. 1553 mean of the A-0326 date coincide with our estimation of the probable calendric date for the site based on ceramic seriation, other material culture traits, and upstreaming from the historical record. Despite extensive excavations and analysis, there is currently no evidence for an earlier fifteenth-century occupation at Klock, and we feel compelled to reject the AA-7404 date as aberrant until such evidence comes to light.

CHAPTER 3

THE SMITH-PAGERIE SITE[1]

LOCATION AND SETTING

The Smith-Pagerie site is located in Ephratah Township, Fulton County, New York (18 E538580 N4763300). At the time of excavation it was owned by Dr. Marcel Pagerie, who very generously granted permission for the explorations but has since passed away. The site is now owned by his children. The site is located approximately 1.5 miles north of the small hamlet of Ephratah, on the east side of County Route 10 and 5.5 miles north of the junction of Caroga Creek with the Mohawk River. It is at an elevation of 940 feet. Just 2,800 feet (0.5 mi) northeast of the well-known Garoga site, the site occupies a similar land form, being located on a high ridge overlooking the creek (Figures 1, 26). The ridge is created by a meander in the creek and has three sides with steep 150-foot slopes down to the water. The site is largely inaccessible from the north, south, or west. To the east the site opens out into a wide, flat plain. The only easy access to the site would have been from this direction. The extent of the site occupation on the ridge probably covered an area of at least 4 acres.

The Windsor association soils at the Smith-Pagerie site are well-drained, gently sloping, coarse-textured soils that formed in deep deposits on glacial outwash terraces. Windsor soils have 2 to 2.5 feet of readily permeable sand or loamy sand, over sand derived mainly from sandstone fragments (Davis and Landry 1978). Excavations at the site revealed a 7- to 10-inch layer of disturbed plow zone consisting of a dark brown humus. The horizon below the plow zone was a light yellow sandy soil. Large subsurface glacial boulders occurred frequently at this level and often appear to have affected the location and placement of structures and features at the site. In contrast to the nearby Klock site with its hard and compacted clay-rich till, the loose, sandy soil at the Smith site facilitated rapid and easy excavation. The plow zone could be easily stripped by shovel scraping, and features and post molds appeared clearly in the sandy subsoil just below the plow zone. This junction is slightly below the prehistoric living floor due to truncation of the original humus or A zone and underlying deposit (B zone) by decades of Euroamerican cultivation.

Although the Smith-Pagerie site is surrounded on three sides by exceedingly steep slopes, to the east the site opens into a broad level plain that extends to the north and south. This area, which is dominated by Windsor soils, would have provided more than 100 acres of easily accessible, level, productive, and easily worked land for the horticultural pursuits of the Smith-Pagerie site inhabitants. Given its close proximity, the southern portions of this area may also have been exploited for the same purpose by the occupants of the Garoga site, a few generations before.

The location and setting of the Smith-Pagerie site is similar to most of the other known Mohawk sites from the sixteenth century, but the site is notable because it is the northernmost semipermanent horticultural village of the Mohawk, from any time period. Campsites and fishing stations of these people are known for a number of Adirondack lakes, but a host of environmental constraints make it unlikely that horticultural pursuits would have been attempted much farther north than the Smith-Pagerie site location. Soil quality declines dramatically just a few miles north of the site, becoming shallow and highly acidic, and the local relief becomes increasingly hilly with steep slopes as the valley floor gives way to the foothills of the Adirondacks. The elevation of the site is hundreds of feet above that of other Mohawk villages located down along the river; farther north, elevations increase dramatically, with lower average temperatures leading to a shorter growing season.

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[1] Also identified as Las. 11-4, NYSM 2334, and NYSOPRHP No. A035-04-0002. Previously called the Smith site (MacNeish 1952:70–71; Lenig 1965:65–66) or the Pagerie site (Lenig 1977:72, 78), this locality is now known as the Smith-Pagerie site (Ritchie and Funk 1973:331; Snow 1995:171).

INVESTIGATIONS: METHODS AND RESULTS

The Smith-Pagerie site has been known to avocational archaeologists for at least 70 years, and most of the hillside middens at the site have been thoroughly dug out by local collectors. MacNeish (1952:70–71) was the first to provide published information on the site, including it in his analysis of Iroquois ceramic types. Later, Lenig (1965:65–67) published additional typological data on the ceramics from the site in his detailed study of the Mohawk chronology. Both researchers relied on the collections of John Swart of Amsterdam, New York. In 1968 Swart brought the site to the attention of Robert E. Funk, then assistant to State Archaeologist William A. Ritchie at the New York State Museum. Swart proposed it as an excellent candidate for the museum's ongoing study of aboriginal settlement patterns in the Northeast.

During the summers of 1968 and 1970, excavations were conducted at the site by a paid field crew from the New York State Museum, and approximately 20 students enrolled in a field methods course at the University at Albany, SUNY. The project was under Funk's overall direction (Figure 24). In 1968 the university field school was directed by Dr. Peter S. Miller. In 1970 the director was graduate anthropology student Philip Lord, Jr. A grid system of 10-foot squares was established and base stakes were emplaced in the adjoining woods outside cultivated areas to facilitate relocation of the grid in subsequent investigations.

The method of excavation consisted of stripping away the plow zone by hand, using shovels to break up and remove the topsoil and then hoes and trowels to clean off and expose the underlying yellow-brown sandy subsoil. All features and post molds uncovered were carefully mapped for each square. Screening was not a regular part of field technique, although screens were sometimes used to maximize recovery of small items from pits.

Excavations during the 1968 field season concentrated on exposing the settlement remains in the central area of the site and testing the surrounding area for burials. By employing a long trench, 230 feet long and 10 feet wide, extending from near the woods on the north to the center of the field, the field crew uncovered a large section of the village in the central area of the site (Figure 25). This work was successful in exposing the remains of four longhouses, one of which was completely excavated (Figures 26, 27). A series of slit trenches was excavated to the east and south of this area, producing evidence of two additional longhouses and a palisade.

The 1970 campaign at the site was undertaken to determine the total number, lengths, and arrangement of the remaining longhouses within the palisade. The field season began with the excavation of a series of trenches between the palisade line and the central loci established in 1968. The longest of these

Figure 24. Photograph of the Smith-Pagerie site as viewed looking west.

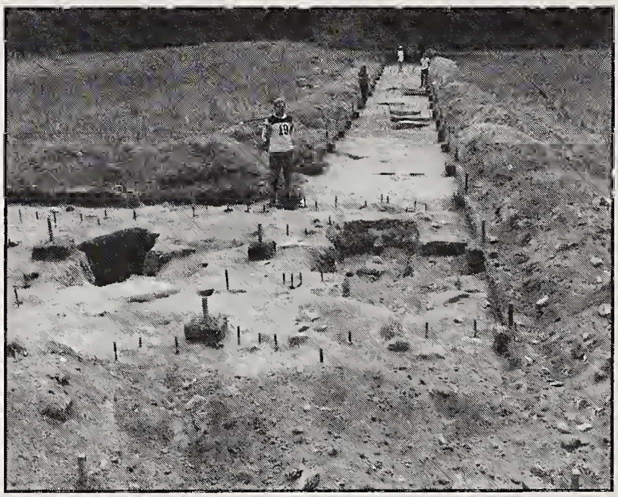


Figure 25. Photograph of long exploratory trench at the Smith-Pagerie site, 1968 field season, looking south. Portion of House 1 visible in foreground, House 2 in middle distance, and House 3 in far end of trench.

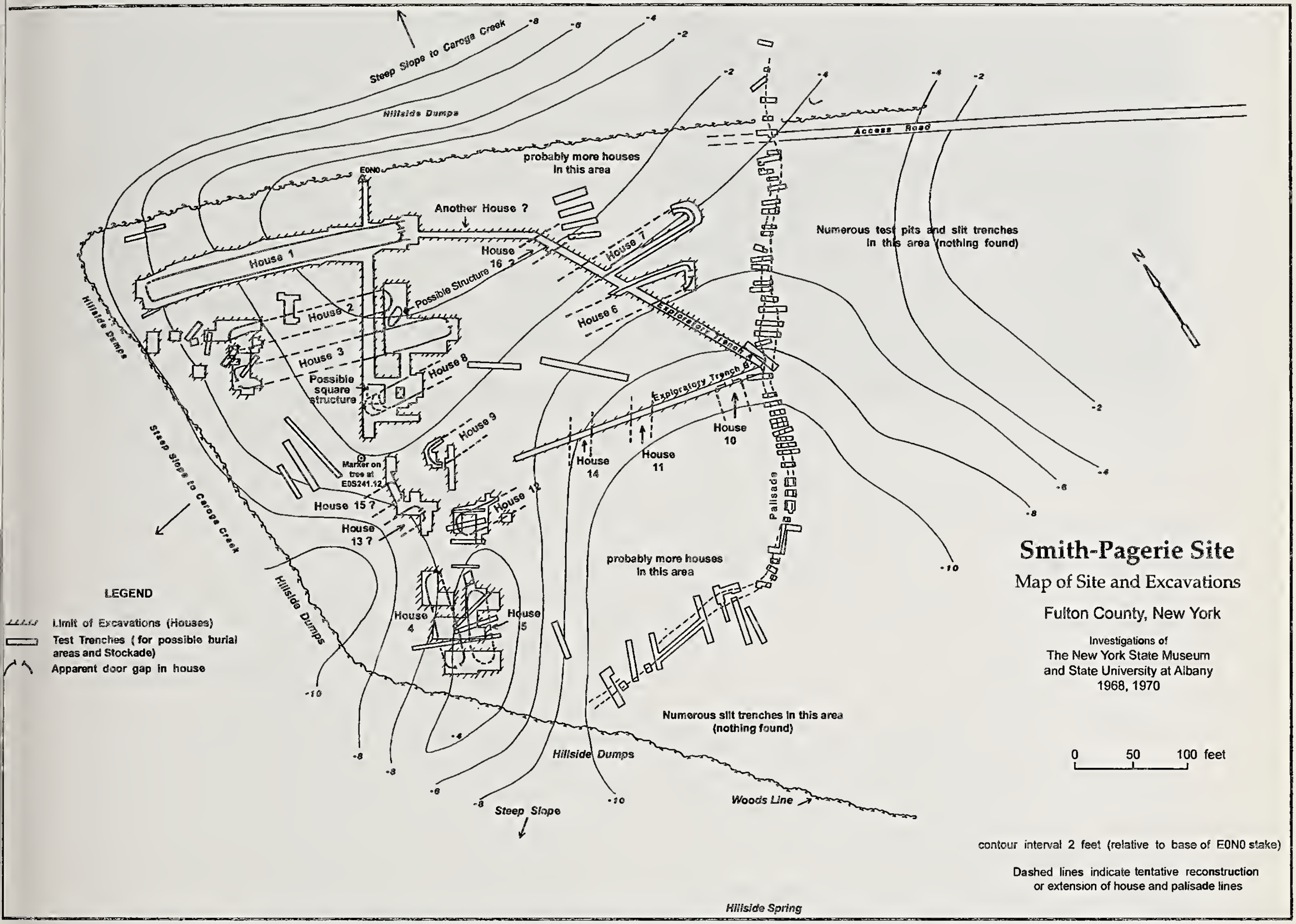

Steep Slope to Caroga Creek
-8
-6
-4
-2
Hillside Dumps
Access Road
E0N0
probably more houses in this area
Another House ?
House 1
House 16 ?
House 7
Possible Structure
House 2
House 3
House 6
Possible square structure
House 8
Exploratory Trench A
Exploratory Trench B
Numerous test pits and slit trenches in this area (nothing found)
N
House 9
Marker on tree at E0S241.12
House 15 ?
House 13 ?
House 12
House 14
House 11
House 10
Palisade
Steep Slope to Caroga Creek
Hillside Dumps
probably more houses in this area
House 4
House 5
Numerous slit trenches in this area (nothing found)
Hillside Dumps
Steep Slope
Woods Line
-10
Hillside Spring
LEGEND
Limit of Excavations (Houses)
Test Trenches (for possible burial areas and Stockade)
Apparent door gap in house
Smith-Pagerie Site
Map of Site and Excavations
Fulton County, New York
Investigations of
The New York State Museum
and State University at Albany
1968, 1970
0 50 100 feet
contour interval 2 feet (relative to base of E0N0 stake)
Dashed lines indicate tentative reconstruction or extension of house and palisade lines

Figure 26. Map of Smith-Pagerie site settlement plan, showing excavated areas, longhouses, palisade, and middens in relation to local topography.

trenches, 5 feet wide, began as Trench A at the east end of the block excavation encompassing House 1 and extended east, then southeast, to intersect the stockade. The direction was then reversed at about a 45-degree angle, and the trench (now Trench B) was extended southwest to the south-central part of the site for a total length of 550 feet. Over their length these trenches intersected the walls of six previously unrecorded longhouses. Additional trenches in central areas of the site crossed the lines of four more longhouses (Figure 26).

It was mildly surprising to learn that at least three houses were located in the southeastern part of the site. This area was lower in elevation than other parts and definitely moister, which would presumably lead to uncomfortably wet living floors within the houses during times of heavy rain or melting snow.

Numerous test pits and slit trenches were excavated on the large, flat area east of the stockade, as well as in the woods adjoining the field and up to a mile away in surrounding areas. These tests were uniformly devoid of burials or other cultural remains.

Approximately one-half of the more than 160 features were excavated, cross-sectioned, and profiled, producing a large artifact assemblage as well as faunal and floral remains. This material was curated at the New York State Museum. An area of approximately 22,600 square feet was exposed over the course of the two field seasons. The excavations provided the basis for listing the Smith-Pagerie site on the National Register of Historic Places in 1979. This monograph constitutes the first detailed site report for this Mohawk component, briefly mentioned in Ritchie and Funk (1973:170, 332, 363).

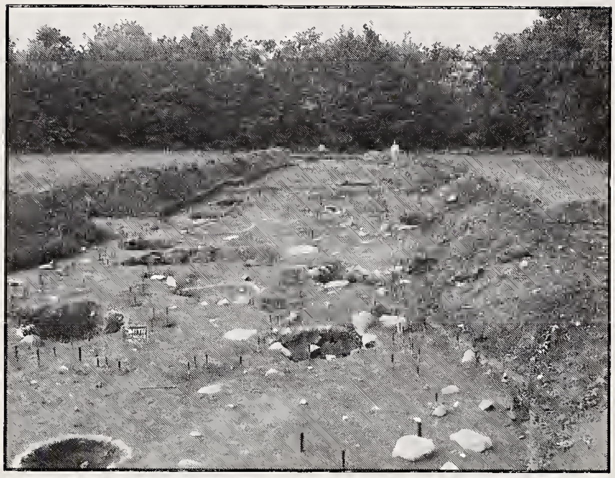


Figure 27. Photograph of excavations at completely exposed House 1, Smith-Pagerie site, showing east end with door gap, storage pits near side walls (some excavated, others marked by painted rims), midline hearths (some also excavated, others marked by painted rims), and bed lines. Post molds indicated by wooden stakes.

LONGHOUSES

Excavations at the Smith-Pagerie site uncovered 10 definite houses, 6 probable houses, a possible square structure, and a possible small oval storage structure (Figure 26). Although post molds and other features were generally easy to see against the yellow-brown sand and gravel subsoil, facilitating the definition of some houses, other houses were more difficult to delineate. Those in the latter category appear to have suffered disproportionately from erosion and plowing.

There were at least 16 houses, but there may have been as many as 20. Houses in the northern, central, and western parts of the site were oriented with long axis east-west, and they were therefore parallel to each other (Houses 1–3, 6–9, 12, 13, 15, 16). Houses in the southernmost group were oriented north-south, also in parallel (Houses 4, 5). Those in the easternmost group were oriented northeast-southwest, again in parallel (Houses 10, 11, 14).
Houses in the individual groups were spaced from 5 to 40 feet apart. (A possible square structure overlapping House 8 is described later.) No houses were encountered in extensive tests outside of (east of) the stockade line. All houses with one or both ends excavated, and with sufficient definition of mold lines, were round ended. Where the data were available, houses ranged from 65 to 230 feet long and 19 to 21 feet wide.

In most cases, there were no unambiguous data on door gaps at the ends of houses, either because of incomplete excavation, or because of indistinct mold patterns. The door gaps that were reasonably well defined ranged from 2 to 4 feet wide. Post-mold lines at the ends of other houses, for example, House 2, seemed to show three or four gaps barely wide enough for people to pass through.

There were no obvious side entrances, even though the walls of some houses had gaps up to 5 feet wide. These gaps could have been side entrances, areas of missing (plowed away) molds, or simply wider than usual spaces between wall posts. Where interior support posts were present, and occurred in lines (bed lines), they averaged 4 to 5 feet from the side walls. Storage pits were usually located along the walls, within the bed lines. Hearths were usually located along the midline (aisle on the main axis). But pits sometimes occurred on the aisle.

Even within completely exposed House 1, midline hearths were not evenly spaced at close intervals. Gaps frequently occurred despite the presence of storage pits adjoining the gaps along the walls; those pits normally suggest the presence of families that would need to build fires on the aisle. Some hearths were doubtless plowed away, because they were generally shallower than storage pits. In other cases fires may never have burned in the open spaces within House 1, because those areas were not occupied by family groups or were used instead for storage.

There were few post-mold lines that could be identified as interior partitions.

House 1. Length 230 feet, width 19 to 21 feet. This was the only completely excavated house on the site (Figures 27–29). Its estimated area was 4,600 square feet. A possible door gap was noted at the west end but in a disturbed area where the end molds were partly obliterated. The shape of the west end was almost certainly rounded despite the disturbance, because the last few molds on the walls curved inward. The east end seems to have been rounded with side-wall extensions 6 and 9 feet long. On the map (Figure 29) this end shows a well-defined gap 2.5 feet wide. There were no obvious side doors; some gaps up to 5 feet wide may be either real side entrances or merely the result of missed or destroyed post molds. It is clear that after the construction of an original structure, 173 feet long, an extension 57 feet long was added to the west end. This extension contained only three pits and one hearth, suggesting that (a) the house was abandoned before the new addition was filled by families or (b) most of the

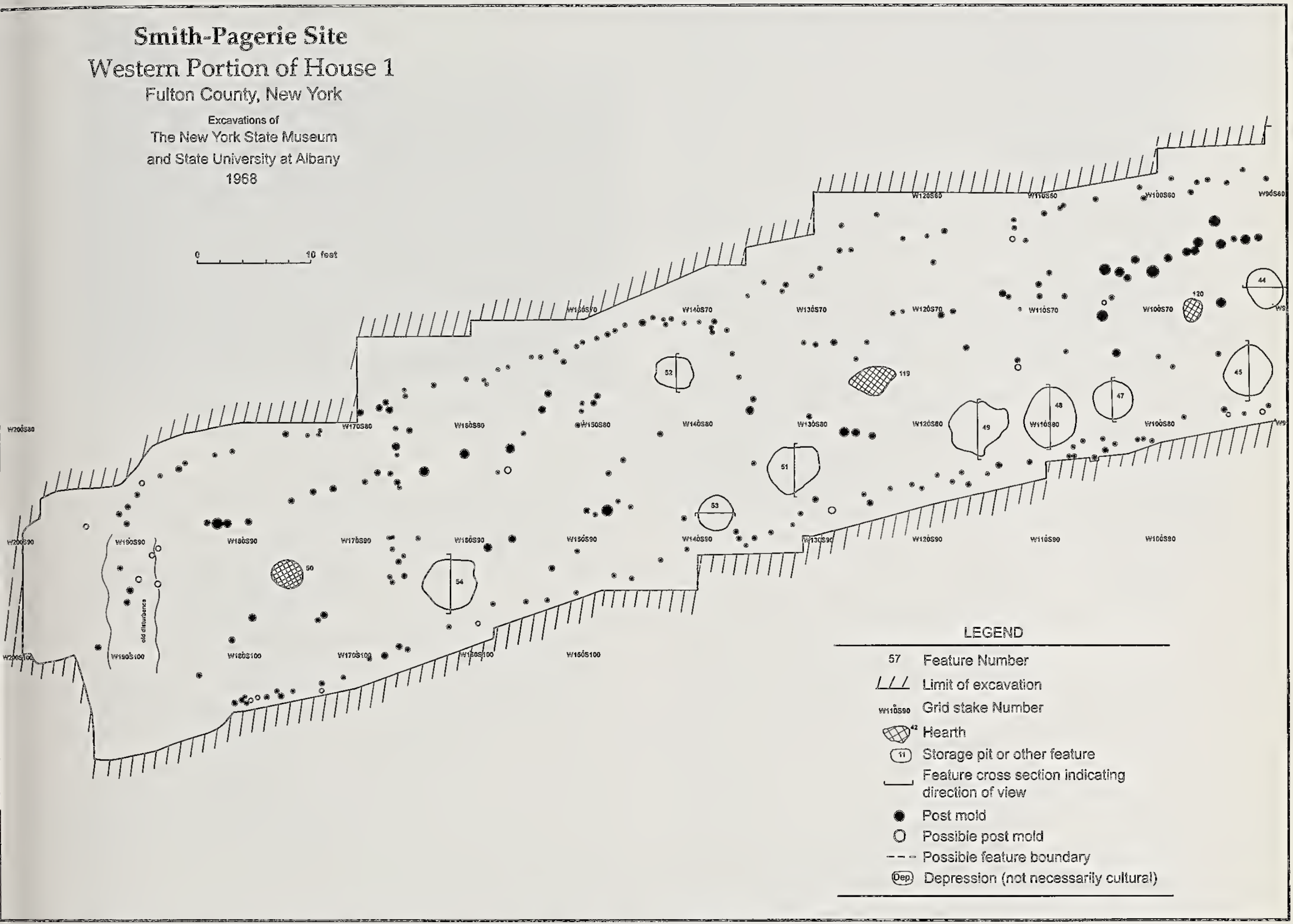

Smith-Pagerie Site
Western Portion of House 1
Fulton County, New York
Excavations of
The New York State Museum
and State University at Albany
1968
0
10 feet
W200S80
W170S80
W160S80
W150S80
W140S80
W130S80
W120S80
W110S80
W100S80
W160S70
W140S70
W130S70
W120S70
W110S70
W100S70
W120S60
W110S60
W100S60
W90S60
W200S90
W190S90
W180S90
W170S90
W160S90
W150S90
W140S90
W130S90
W120S90
W110S90
W100S90
W200S100
W190S100
W180S100
W170S100
W160S100
W150S100
old disturbance
50
52
54
53
51
119
49
48
47
120
44
45
LEGEND
57 Feature Number
Limit of excavation
W110S90 Grid stake Number
42 Hearth
11 Storage pit or other feature
Feature cross section indicating direction of view
● Post mold
○ Possible post mold
Possible feature boundary
Dep Depression (not necessarily cultural)

Figure 28. Detailed map of western portion of House 1, Smith-Pagerie site.

addition served another purpose such as storage of foodstuffs in above-ground bark barrels.

Even within the original structure, midline hearths were irregularly spaced, with gaps up to 53 feet long. Only 7 hearths were identified. Some hearths may have been plowed away, because these features were usually quite shallow. A rough estimate of the original number of hearths, based on the spacing of observed hearths and the spacing of bedline pits presumed to be associated with family living areas, suggests there were from 10 to 14 midline hearths within this large house. There were also storage pits (in this case 5) along the midline, a phenomenon seen in other houses on this site and on other Mohawk sites as well. Not counted with the interior hearths was a single hearth a short distance outside the east end of the house.

In the western half of the house, including the addition, bed lines were fairly well delineated, although support posts were irregularly spaced. The longest line of support posts (i.e., lacking gaps more than 4 ft wide) was 40 feet long. Gaps in the bed lines elsewhere in the house were up to 30 feet long. Bed lines measured 4 to 5 feet from the side walls, up to 6 feet in one part of the house.

Only two or three moderately well defined partitions can be discerned within House 1 on the maps (Figures 28, 29).

House 2. Length 145 feet, width 19 to 21 feet. The total area of this house is estimated at 2,900 square feet. Excavations succeeded in exposing 700 square feet, or 24 percent of the house (Figure 26). The west end was poorly defined, and no clear-cut door gap could be proposed. The east end was rounded. Although this end lacked a single, clear door gap, the post molds could be interpreted to indicate four gaps, each 2 feet wide, separated by three groups of just two or three molds each.

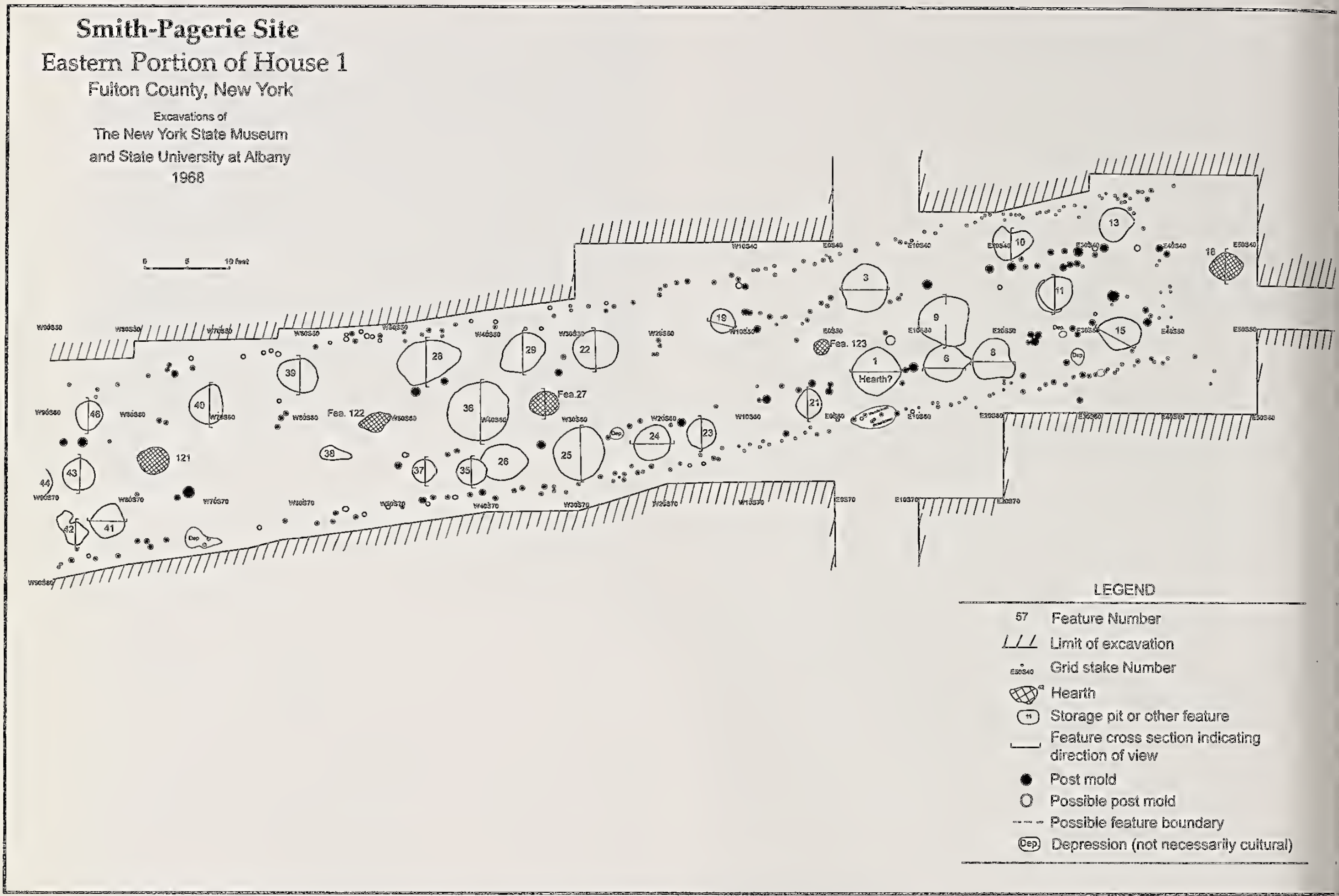

Smith-Pagerie Site
Eastern Portion of House 1
Fulton County, New York
Excavations of
The New York State Museum
and State University at Albany
1968
0 5 10 feet
Fea. 122
Fea.27
Fea. 123
121
Hearth?
LEGEND
57 Feature Number
Limit of excavation
Grid stake Number
Hearth
Storage pit or other feature
Feature cross section indicating direction of view
Post mold
Possible post mold
Possible feature boundary
Depression (not necessarily cultural)

Figure 29. Detailed map of eastern portion of House 1, Smith-Pagerie site.

Bed lines were sporadically indicated by large support post molds spaced 4 to 5 feet from the side walls. No convincing interior partitions can be proposed. There were some midline hearths and at least one midline pit. This was probably a fully occupied house.

House 3. Length 190 feet, width 20 feet (Figures 26, 30). Approximately 1,800 square feet, or 47.4 percent of the total area of 3,800 square feet, were uncovered. The west end was poorly defined, therefore no door gap is proposed. The east end was rounded; on Figure 26 there appear to be two door gaps, each 2 feet wide. No obvious side doors could be discerned, but there were several gaps in the wall molds on opposite sides of the house. These gaps were 2 to 3 feet wide. Much of the middle section was not excavated. Nine midline hearths were uncovered in excavated portions of the house. Most storage pits were along the walls, but some were in the middle.

Some sections of bed lines were observed, 5 to 6 feet from the walls. They consisted chiefly of relatively large post molds. There were two interior arrangements of molds that vaguely suggested partitions.

The available data show that this house was well filled with pits and hearths from end to end, indicating it was fully occupied by Mohawk families.

House 4. At least 90 feet long. The width was 19 to 21 feet. Some portions were not fully excavated, including the area where the north end appeared to be. Many molds were missing. In this case and also in the case of House 5, the structure was, to some degree, delineated with the aid of rows of bed-line pits. These features were deeper than hearths and better able to survive plowing. The south end was rounded, and showed a door gap 4 feet wide. At least five hearths and one pit were present on the midline. Some segments of the bed lines were evident from sporadic large support post molds, and these averaged 5 feet from the walls.

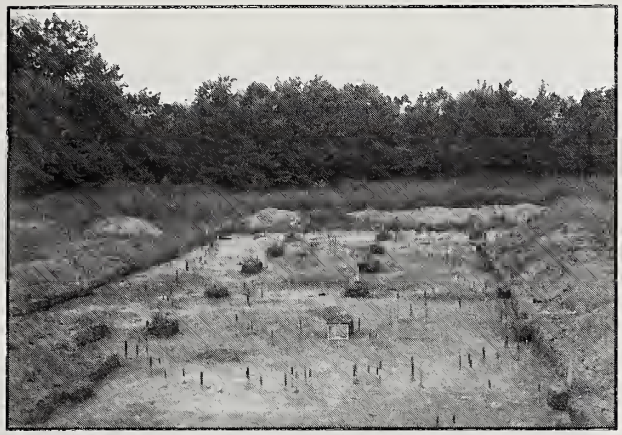


Figure 30. Photograph of excavated portion of House 3, Smith-Pagerie site.

Despite the less-than-ideal definition of this structure, its former area was probably not much more than 1,800 square feet, and 1,070 square feet, or 59.4 percent of it, were excavated.

House 5. Approximately 60 feet long, 19 to 20 feet wide. The area enclosed by the walls is estimated at 1,200 square feet. Although the overall length was established, only 640 square feet, or 53.3 percent of this house, were excavated. As in the case of House 4, the wall lines were incomplete due to decades of plowing. Rows of pits paralleling bed lines helped define the house. The south end was indistinct, the north end was apparently rounded, and no door gaps were apparent. There were at least two central hearths.

House 6. The length was more than 65 feet (only the eastern part was uncovered), and the width was 20 feet. The east end was not well defined. Pits were arranged along the bed lines. Only walls, not interior portions, were exposed by the slit-trenching method used. Only 465 square feet of this house were excavated.

House 7. The length of this house was more than 105 feet (again, only the eastern part was exposed by slit trenching), and the width was 20 feet. The east end was rounded, but no door gap was apparent. Several storage pits were exposed within the bed line along the south wall of the house. The total area exposed was about 530 square feet.

House 8. The length was more than 40 feet (only the extreme western part was uncovered). The width was approximately 20 feet. An area of approximately 1,040 square feet was uncovered. Unfortunately the shape of the west end was indistinct, because of the considerable number of post molds. Part of the confusion is the result of another structure, apparently square in shape, overlapping with House 8. It did appear, however, that House 8 had been enlarged by three or four successive additions to the west end. Those additions preceding the final one were curved, indicating a rounded end, and were spaced 5 to 6 feet apart. Features were lacking over a distance of 48 feet from the west end. This may indicate a situation like that in House 1, in which the largely empty portion is hypothesized to have been used as a storage shed, or it may have resulted from the abandonment of the house before it was fully occupied by Mohawk families. Possible bed lines were positioned about 5 feet from the side walls. No interior partitions were evident.

House 9. Length more than 15 feet (only 250 sq ft of the west end were exposed). This house was 19 to 20 feet wide. The west end was rounded and showed no clear door gaps, but there were several small gaps in the mold lines of 1.5 to 2 feet. One central hearth was visible in the dug portion. There was a probable bed line only 3 feet from the wall. No pits were recorded within the excavated portion.

House 10. A probable house in the long exploratory trench, indicated by the apparent north end of a structure 20 feet wide with a door gap 3 feet wide. Two pits were associated.

House 11. Also a probable house in the long exploratory trench, indicated by two parallel lines of post molds running at right angles to the trench. The lines were about 19 to 20 feet apart. No features were exposed.

House 12. Length estimated at more than 40 feet (only 550 sq ft of the western portion exposed), width 19 to 20 feet. The poorly defined west end was apparently rounded, with no obvious door gap. The north wall was not well defined, because the molds uncovered were so numerous and scattered. In fact, another overlapping structure may be indicated. No hearths were exposed, and two storage pits were recorded.

House 13. Probable house, only about 150 square feet of the putative east end exposed. The post molds were irregularly grouped with big gaps. The end was at least 15 feet wide and rounded in shape, with a door gap 3 feet wide. The side walls were not sufficiently exposed for mapping, but the width of the house may have been the same as the other houses (i.e., ca. 20 ft). No features were exposed.

House 14. Probable house indicated by two parallel lines of post molds running perpendicularly across the exploratory trench. If the lines represent the walls of a house, it was about 20 feet wide. No features were exposed.

House 15. Probable house indicated by a group of post molds that unfortunately failed to form discernible lines. Two features may have been associated.

House 16. Probable house indicated by two parallel lines of molds, 19 to 20 feet apart, running across the exploratory trench. No features were exposed.

OTHER POSSIBLE STRUCTURES

A small oval enclosure was indicated by a group of widely spaced post molds in the area between Houses 2 and 3 (Figure 26). The mold pattern measured 16 feet long, 6 to 7 feet wide. Overlapping it, but not clearly associated with it, were a feature and animal burrow. Missing molds on the side facing southeast suggest a door gap 6 feet wide. One may speculate that the structure was intended for storage, perhaps of corn.

Overlapping the west end of House 8, in Sections E0S180, E10S180, E20S190, E20S200, and E0S190, were a number of post molds clearly not part of House 8 or House 3 north of it. Two well-defined lines at right angles to each other on the north and east and less well-defined lines on the south and west suggest a square structure measuring about 16 to 18 feet on a side (Figure 26). Its south wall requires some speculation, because of the confusion of molds resulting from several additions to the west end of House 8. Nevertheless, there can be no doubt that another structure existed in the area. There is a possibility that the observed wall lines represent part of another longhouse that extended westward beyond our excavations. More molds north of the presumed structure, in particular a line parallel to, and 4 feet from the north wall already described, may represent extensions of the structure. No features were found in the area.

OTHER SETTLEMENT ASPECTS

Most of the refuse at the site was disposed of by discarding it down the steep slopes that bordered the site on three sides. Those side-hill refuse middens located by test pits showed evidence of depletion and disturbance by heavy amateur digging in years past, undoubtedly the chief source of the ceramic samples used in studies by MacNeish (1952) and others. Therefore the New York State Museum and University at Albany crews devoted very little time to those deposits.

PALISADE

Because the Smith-Pagerie site is adjoined on the north, west, and south by steep slopes dropping off to Caroga Creek some 150 feet below, we speculated that a defensive palisade might be found in the broad, level field east of the longhouses. A test trench confirmed the existence of such fortifications and the crew proceeded to follow the stockade by means of a series of 56 slit trenches. These began near the edge of the woods on the south and continued into the wooded area to the north of the access road. It was determined that the palisade was roughly bow shaped as seen from above (Figure 26), and consisted of at least two, perhaps three, parallel lines of posts. Most of the post molds were relatively large in diameter (up to 24 in), but others were fairly small, as little as 2.5 to 4 inches in diameter (Figures 31, 32). Depths varied from 13 to 48 inches, the mean being 26 inches. The height of the palisade in the heyday of the village must remain a subject for speculation.

Assuming that the palisade protected only the eastern approaches to the site, it was approximately 400 feet long. To accomplish its purpose it must have extended to the edges of the hilltop and downslope for some distance. But the exact length remains unknown, because the post molds were increasingly difficult to trace as excavations proceeded into the woods. The work was hindered by dense roots and undergrowth, but the obscuring of the molds may have been due in part to erosion, leaching, or some other factor. Numerous test pits and slit trenches failed to disclose additional palisade segments on northern, western, and southern areas of the site.

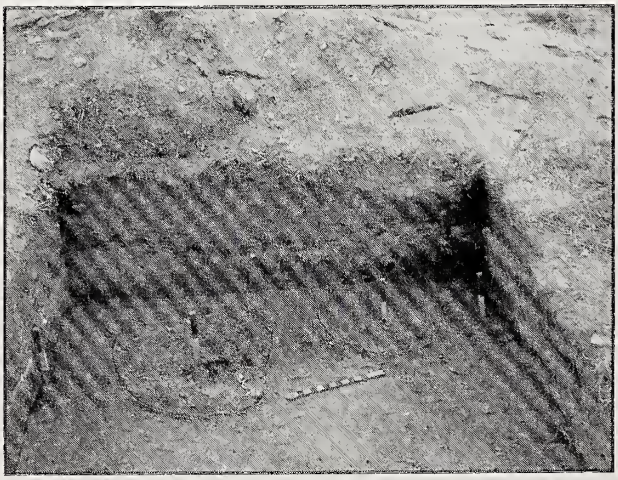


Figure 31. Photograph of selected post molds in the stockade, Smith-Pagerie site. Note relatively large size of molds as compared with molds in longhouse walls.

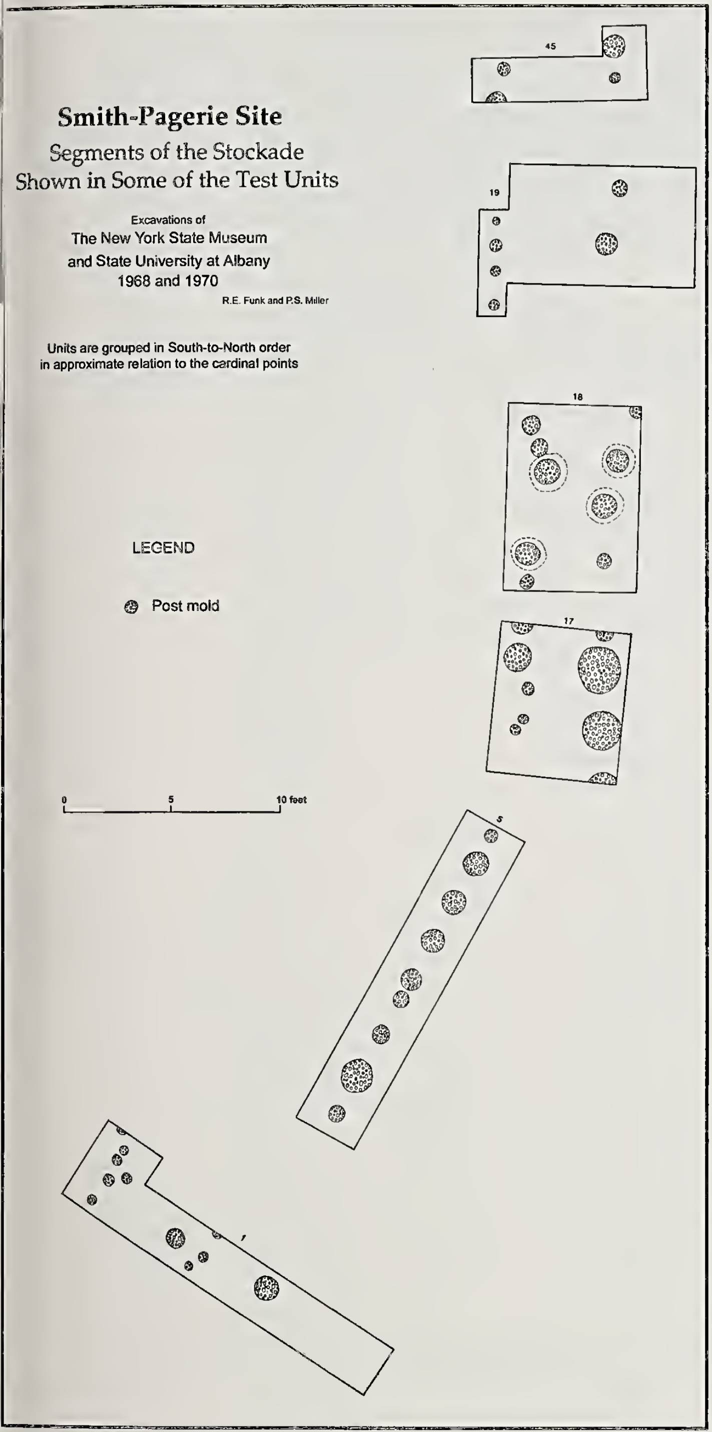

Smith-Pagerie Site
Segments of the Stockade
Shown in Some of the Test Units
Excavations of
The New York State Museum
and State University at Albany
1968 and 1970
R.E. Funk and P.S. Miller
Units are grouped in South-to-North order
in approximate relation to the cardinal points
LEGEND
Post mold
0
5
10 feet
45
19
18
17
5
1

Figure 32. Partial detail map of stockade excavations, Smith-Pagerie site.

POST MOLDS: ATTRIBUTES AND DESCRIPTIVE STATISTICS

Diameter and depth measurements were taken on limited numbers of cross-sectioned post molds in Houses 1, 3, and the palisade. Only diameter measurements are available for Houses 4 and 6. Data are almost completely lacking for the other houses. These measurements, in inches, provide reasonably representative, unbiased samples of the hundreds of molds in the walls and bed lines of the houses. Table 12 provides the summary statistics for these samples.

As at the Klock site, wall post molds displayed mean diameters of around 3.6 to 4 inches. Mean depth varied from 5.3 to 6.8 inches. Large numbers of post molds were routinely cross-sectioned in each house pattern following exposure. This was necessary to validate them as authentic post molds, rather than root channels, holes from plowed out stones, animal burrows, and so on. The vast majority proved to be authentic, although a minority was ambiguous enough to be mapped as open circles; authenticated molds were mapped as filled circles. Drawn cross-sections are not available in the field notes, but it can be stated from the senior author's memory that most of the validated molds were definitely conical in section, usually with sharp tips at the bottom, and a minority had blunt tips. As at the Klock site, numerous molds contained dark, charcoal-stained and flecked soil, and also fairly often chert flakes, pottery fragments, and pieces of refuse bone. Following abandonment of the site, as posts rotted out or fell out, humus, sand, and refuse lying nearby on the living floors trickled into or washed into the open holes; they quickly became filled to the brim.

The slender profiles and pointed tips of the wall molds revealed how the longhouse frames were constructed by the forcible penetration of the posts into the ground. This task doubtless required the strength of several people, twisting and pulling down on the saplings at the same time. It must have been scheduled for relatively warm, moist times of the year when the soil was soft, because during winter months the ground would have been frozen to a depth of several inches.

Palisade post molds average 9.6 inches in diameter. No attempt was made to describe molds in the outer line of larger molds separately from those in the putative inner lines, even though the latter tended to be smaller than the former. Nevertheless, it is clear that the palisade molds were considerably larger in average diameter and greater in depth than longhouse post molds.

Table 12. Smith-Pagerie Site Post-Mold Statistics, Diameters (Top) and Depths (Bottom)

DIAMETERS	House 1		House 3	House 4	House 6	Palisade
	Walls	Bed lines	Walls	Walls	Walls	
Mean	4.02	7.9	3.7	3.9	3.6	9.62
Mode	4	7.5	3	4	3.5	12
Median	4	7	3.5	4	3	9
Standard deviation	0.94	1.86	1.1	1.19	0.74	4.58
Range	3.5	6.5	4.5	6	3	21.5
Minimum	2.5	5	1.5	2	2	2.5
Maximum	6	11.5	6	8	5	24
N	82	16	58	38	61	129

DEPTHS	House 1		House 3	Palisade
	Walls	Bed lines	Walls	
Mean	5.3	6.5	6.8	26.2
Mode	3.5	7	5	14
Median	6	4	5.75	24
Standard deviation	2.7	2.7	3.9	11.3
Range	12	7.5	17	35
Minimum	1	3	2	13
Maximum	13	10.5	19	48
N	37	15	58	23

Note: Walls = all wall posts; Bed lines = bed line and other interior support posts. All measurements in inches.

The larger stockade posts, unlike the smaller ones and those in longhouse walls, could not have been erected by driving them into the ground, no matter how soft and wet. They were simply too thick and heavy for a work crew to use that technique. In cross-section the molds themselves provide clues to the method actually used. They are usually bluntly rounded at the base, and sometimes the adjoining soil shows evidence that a hole somewhat wider than the post was deliberately dug to accommodate the post, then sand and gravel were filled in around it to hold it firmly in place.

FEATURES OTHER THAN POST MOLDS

Features other than post molds at the Smith-Pagerie site break down into two main categories: hearths and storage pits. Table 13 is a complete list of all features recorded in the investigations. It presents their number designations, grid location, whether or not excavated, assignment to houses, general description, diameter, and if excavated, depth and calculated volume. It should be noted that some numbers are no longer in use, and some features have been renumbered. Although measurements of diameters are available for most features, those measurements are considered approximate except for excavated features. This is because features tended to be slightly wider at the junction of plow zone with subsoil than at greater depths. Precise measurements of diameter could be determined only for excavated features.

Table 13. Smith-Pagerie Site List of Features

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
1	E0S60	Yes	House 1	Pit	66/28	31,612
2	E0S100	Yes	House 2	Pit	72 x 48/12	11,197
3	E0S50	Yes	House 1	Pit	64/30	31,848
4	E0S110	Yes	House 2	Pit	60/39	36,389
5	E10S100 (under pin)	Yes	House 2	Pit	60+/?	
6	E10S60	Yes	House 1	Pit	48 x 60/30	22,673
7	E0S110	Yes	House 2	Pit	36/42	42,750
8	E10S60	Yes	House 1	Pit	54 x 60/66	168,417
9	E10S50-60	Yes	House 1	Pit	72 x 66/39	48,125
10	E20S40 (under pin)	Yes	House 1	Pit	54 x 36/42	66,798
11	E20S50	Yes	House 1	Pit	42/60	83,127
12	E0S120	Yes	House 2	Pit	36/72	73,287
13	E30S40	Yes	House 1	Pit	48 x 42/48	76,341
14	E0S140 (under pin)	No	House 3	Pit ?		
15	E30S50-60	Yes	House 1	Pit	60 x 48/42	96,190
16	E0S160	Yes	House 3	Pit	36/30	30,536
17	E0S150	Yes (1/2)	House 3	Pit	96+?/57	136,151
18	E40S50	Yes	Outside east end of 1	Hearth	48 x 36/15	6,858
19	W20S50	Yes	House 1	Pit	32/27	7,166
20	?	Yes	?	Pit		

Continued on next page

Table 13—*Continued*

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
21	W10S60-70	Yes	House 1	Pit	36 x 42/32	12,615
22	W30S60	Yes	House 1	Pit or hearth	60 x 54/24	20,210
23	W20S70	Yes	House 1	Pit	42/31	14,173
24	W30S70	Yes (1/2)	House 1	Pit	63/30	30,860
25	W30-40S70	Yes	House 1	Pit	62 x 72/40	46,539
26	W40S70	Yes	House 1	Pit	60 x 48/?	
27	W40S60	Yes	House 1	Hearth	36 x 42/10	3,942
28	W40S60 (under pin)	Yes	House 1	Pit	84 x 60/50	67,180
29	W40S60	Yes	House 1	Pit	42 x 48/32	50,894
30 (renumbered 127)						
31 (renumbered 128)						
32 (renumbered 129)						
33 (renumbered 130)						
34 (renumbered 131)						
35	W50S70	Yes	House 1	Pit	36/42	42,751
36	W50S60	Yes	House 1	Pit	72 x 84/58	91,458
37	W50S70	Yes	House 1	Pit	30/20	4,665
38	W60S70	Yes	House 1	Hearth	24 x 18/6	
39	W60S60	Yes (1/2)	House 1	Pit	48 x 54/25	16,852
40	W70S60	Yes (1/2)	House 1	Pit	48 x 54/48	98,056
41	W80S70	Yes (1/2)	House 1	Pit	48 x 42/30	15,745
42	W90S80	Yes	House 1	Pit	42 x 24/24	6,774
43	W90S70	Yes (1/2)	House 1	Pit	42/58	80,356
44	W100S70	Yes	House 1	Pit	38 x 42/46	57,805
45	W100S80	Yes	House 1	Pit	48 x 54/30	61,284
46	W90S60-70	Yes	House 1	Pit	42 x 36/48	57,341

Table 13—*Continued*

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
47	W110S80	Yes	House 1	Pit	42/66	91,439
48	W110S80 (under pin)	Yes	House 1	Pit	60 x 54/39	32,841
49	W120S80-90	Yes	House 1	Pit	60/36	33,590
50	W180S100	Yes	House 1	Hearth	30/3	700
51	W140S90	Yes	House 1	Pit	48 x 54/48	86,859
52	W150S80	Yes	House 1	Pit	36/53	53,948
53	W140S90	Yes	House 1	Pit	31/24	18,114
54	W160S100	Yes	House 1	Pit	48 x 60/53	121,381
55	E90S370	Yes	House 4	Pit	36 x 60/30	17,915
56	E90S390	Yes	House 5	Pit	48 x 36/72	99,752
57	E80S400	Yes	House 4	Pit	48/54	32,246
58 (not used)					60 x 48	
59	E100S400	Yes	House 5	Pit	54 x 36/66	10,497
60	E100S400	Yes	House 5	Pit	36/24	8,062
61	E100S400	No	House 5	Hearth	30	
62	E20S150	Yes	House 3	Pit	60/24	67,859
63	E30S140	Yes	House 3	Hearth	36 x 24	
64	E30S140	Yes	House 3	Pit	48/57	103,145
65	E30S140	No	House 3	Pit 36		
66	E30S140	No	House 3	Pit	18	
67	E40S150	Yes	House 3	Pit	60/48	135,717
68	E40S140	Yes	House 3	Pit	48 x 60/?	
69	E40S140	No	House 3	Hearth	18	
70	E40S140	No	House 3	Hearth	24	
71	E40S140	Yes	House 3	Pit	48 x 36/48	86,859
72	E40S140	No	House 3	Pit	24 x 30	

Continued on next page

Table 13—*Continued*

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
73	E50S140-150	No	House 3	Pit	48 x 36	
74	E50S130	Yes	House 3	Pit	?/39	
75	E60S140	No	House 3	Hearth	24	
76	E70S140	Yes	House 3	Pit	36/48	48,858
77	W70S130	No	House 3	Pit	36?	
78	W70S120	No	?	Pit	60 x 36	
79	W70S120	No	?	Pit	30	
80	W100S130	Yes	House 2	Pit	60/56	158,337
81	W100S130	No	House 2	Hearth	?	
82	W110S140	No	House 2	Hearth	?	
83	W110S130	No	House 2	Pit	30 x 36	
84	W140S140	Yes	Outside of 2	Pit	51 x 43/30	17,176
85	W100-110S180	No	House 3	Hearth	24?	
86 (not on maps)						
87	E30S120-130	Yes	House 3	Pit	?	
88	W110S190	No	Outside of 3	Pit	?	
89	W70S120-130	No	?	Pit	36 x 24	
90	W130S130	No	Between 1 and 2	Pit	?	
91	W190S150	No	?	Pit	?	
92	E80S420	No	House 4	Hearth	36 x 24	
93	E40S210	Yes	South of 8	Pit	48/60	108,573
94	E40S210	No	South of 8	Pit	42	
95	E40-50S190	Yes	House 8	Pit	72/70	94,051
96 (renumbered 134)						
97 (renumbered 135)						
98	E70S370	No	House 4	Pit	24	
99	E70S370	No	House 4	Pit	48 x 54	

Table 13—*Continued*

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
100	E60-E70S370	No	House 4	Hearth	48	
101	E60S370	No	House 4	Hearth?	60 x 48	
102 E	60S360	No	House 4	Depression, disturbance	36 x 24	
103	E40S280	No	House 15?	Hearth	48 x 26	
104 (not used)						
105	E70S270	No	Near 13 and 15	Pit	?	
106	E70S240	No	?	Hearth	24	
107	E70S240	No	House 9	Hearth	18	
108 (Not used)						
109	Trench A, part 6	No	House 7	Pit	48 x 42	
110	Trench A, part 7	No	House 7	Pit	48?	
111	Trench A, part 11	No	House 6	Pit	36 x 48	
112	Trench A, parts 11, 12	No	House 6	Pit	36	
113	Trench A, part 15	No	Not in a house	Hearth	18	
114	Trench A, part 19	No	Not in a house	Hearth	48 x 12	
115	Trench B, part 25	No	House 10	Pit	?	
116	Trench B, part 26	No	House 10	Pit	?	
117	Trench B, part 44	No	Not in a house	Pit	60 x 24	
118 (part of Feature 65?)	E20S140	Yes	House 3	Depression or pit?	24 x 12/10	?
119	W130S80	No	House 1	Hearth	48 x 30	1

Continued on next page

Table 13—*Continued*

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
20	W100S80	No	House 1	Hearth	18	
121	W80S70	No	House 1	Hearth	48 x 36	
122	W60S70	No	House 1	Hearth	42 x 24	
123	W10S60	No	House 1	Hearth	24	
124	E100S370	No	House 5	Hearth	18	
125 (not used)						
126	E100S370-380	No	House 5	Depression	36 x 30	
127	E60S390	Yes	House 4	Hearth?	30/15	3,500
128	E60S390	Yes	House 4	Hearth?	36 x 30/18	5,081
129	E60S400	Yes	House 4	Pit	60 x 48/33	24,940
130	E60S400	No	House 4	Pit	42 x 24/18	13,585
131	E70S400	No	House 4	Hearth	42 x 30	
132	E70S400	No	House 4	Hearth	12	
133	E70S390	No	House 4	Hearth?	12	
134	E40S180	Yes	House 8	Pit	60 (39)	110,270
135	E50S170 (under stake)	No	House 8	Pit?	30	
136	E100S290	No	House 12	Pit?	?	
137	E30S100	No	?	Hearth?	84 x 30	
138	E0S110	No	House 2	Hearth?	24	
139	E240S100	No	House 6	Pit	?	
140	E230S100	No	House 6	Pit	36	
141	E0S140	Yes	House 3	Pit	18	
142	E0S150	No	House 3	Hearth	24 x 36	
143	E30S150	Yes	House 3	Hearth	36	
144	E30S150	Yes	House 3	Hearth	24	
145	E20S130	Yes	North of 3	Hearth	36 x 60	

Table 13—*Continued*

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
146	E20S130	Yes	North of 3	Hearth	36 x 24	
147	E20S150	Yes	House 3	Hearth	66 x 18/6	?
148	E30S280	No	House 15	Pit	?	
149	E50S140	No	House 3	Pit	60	
150	E260S60	No	House 7	Pit	?	
151	E220S80	No	House 7	Pit	42	
152	E220S80	No	House 7	Pit	48	
153	E280S40	No	House 7	Pit	60	
154	E220S70	No	House 7	Pit	?	
155	E220S60	No	House 7	Pit	?	
156	E210S80	No	House 7	Pit	?	
157	E240S70	No	House 7	Pit	48	
158	E230S70	No	House 7	Pit	48	
159	E120S50	Yes	House ?	Hearth	18/6	504
160	E80S50	Yes	House ?	?	21/8	914
161	E100S290	No	House 12?	Pit?	?	
162	E70S400	No	House 4	Pit?	18	
163	E20S140	Yes	House 3	Depression (disturbance ?)	108 x 18/6	?

THE LOCATIONS OF FEATURES INSIDE AND OUTSIDE OF HOUSES

House 1. Features 1, 3, 6, 8–11, 13, 15, 19, 21-29, 35–54, 119–123.
Central hearths: Features 27, 38, 50, 119, 121–123.
Midline pits: Features 9, 11, 36, 43, 44.
Probably related hearth outside east end: Feature 18.
Excavated features: 1, 3, 6, 8–11, 13, 15, 18, 19, 21–29, 35–54.

House 2. Features 2, 4, 5, 7, 12, 80–83, 138.
Central hearths: Features 81, 82, 138.
Midline pit: Feature 7.
Excavated features: 2, 4, 5, 7, 12, 80.
Possibly related features outside house: 84, 90.

House 3. Features 14, 16, 17, 62-77, 85, 87, 118, 141–144, 147, 149, 163.
Central hearths: Features 63, 69, 70, 75, 85, 144, 147.
Midline pits: Features 68, 149.
Excavated features: 16, 17, 62–64, 67, 68, 71, 74, 76, 87, 118, 141, 143, 144, 147, 163.
Just outside house: Feature 88.

House 4. Features 55, 57, 92, 98–102, 127–133, 162.
Central hearths: Features 92, 100, 127?, 128?, 131–133.
Midline pits: Feature 101.
Excavated features: 55, 57, 127–129.

House 5. Features 56, 59, 60, 61, 124, 126.
Central hearths: Features 61, 124.
Midline pits: none exposed.
Excavated features: 56, 59, 60.

House 6. Features 111, 112, 139, 140.
Central hearths: none exposed.
Midline pits: Feature 111?
Excavated features: none.

House 7. Features 109, 110, 150–158.
Central hearths: none exposed.
Midline pits: Feature 110.
Excavated features: none.

House 8. Features 95, 134, 135.
Central hearths: none exposed.
Midline pits: Feature 134.
Excavated features: 95, 134.
Outside south end of house: Features 93, 94.

House 9. Feature 107.
Central hearths: Feature 107.
Midline pits: none exposed.
Excavated features: none.

House 10. Features 115, 116.
Central hearths: none exposed.
Midline pits: none exposed.
Excavated features: none.

House 11. No features exposed.

House 12. Features 136, 161?.
Central hearths: none exposed.
Midline pits: none exposed.
Excavated features: none.

House 13. No features exposed.

House 14. No features exposed.

House 15. Possibly Features 103, 148.
Central hearths: Feature 103.
Midline pits: Feature 148?
Excavated features: none.

House 16. No features exposed.

Near Houses 13, 15. Feature 105.

Not near any particular house. Features 78, 79, 89, 91, 106, 113, 114, 117, 159, 160.

DISCUSSION OF FEATURES

As was true of the Klock site, features at the Smith-Pagerie site fell into two principal classes: hearths and storage pits. Minor categories included features not clearly identifiable as pits or hearths, and depressions. Depressions could be either cultural or noncultural in origin; only a small number of those encountered were assigned numbers because they evinced possible connection with the Mohawk occupation of the site. The others were probably stone holes, burrows, or old tree stump locations.

Pits outnumbered hearths by 2.7 to 1. In enumerating the features from the site, it should be remembered that 12 numbers are no longer used. Therefore the actual number of recorded features is 151.

Hearths were almost uniformly smaller and shallower than pits and were identified in part by the oxidation of subsoil around the edges or of lenses within the fill. Other important attributes were relatively copious amounts of charcoal, sometimes occurring as dense lenses at or near the base, and fire-cracked cobbles (Figure 38).

Only five pit features showed no evidence of stratification in cross-section. But stratification varied tremendously, from vague color changes or capping humic lenses in otherwise undifferentiated sand-filled features, to very complex, multiple lensing and layering (Figures 33–37). The complex layer-

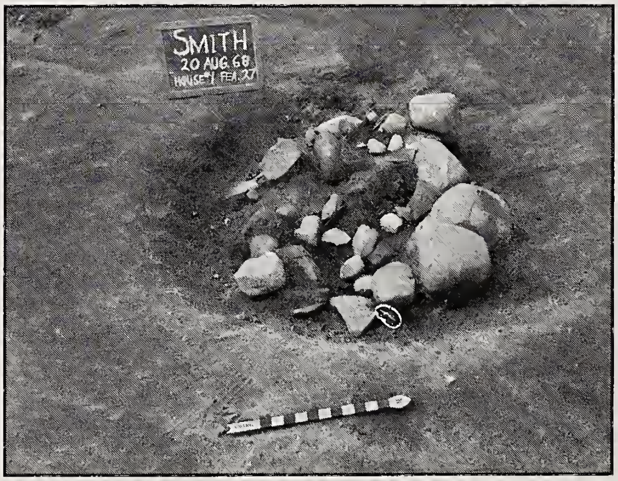


Figure 33. Photograph of hearth, Feature 27, in House 1, Smith-Pagerie site.

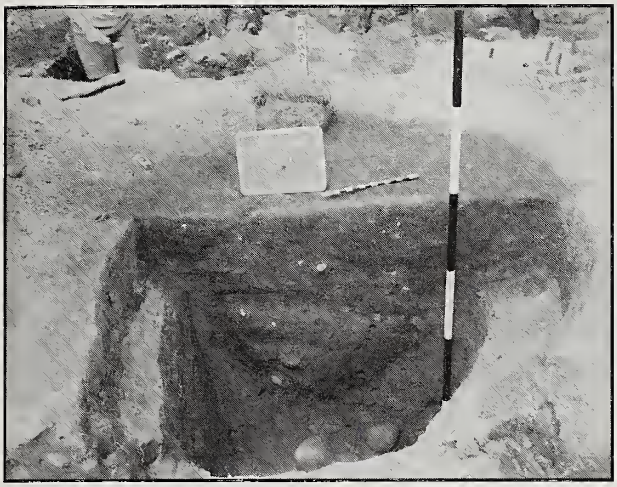


Figure 34. Photograph of cross-sectioned storage pit, Feature 9, Smith-Pagerie site. Stratification, sometimes in complex, colored layers, is visible in this and subsequent pit photographs.

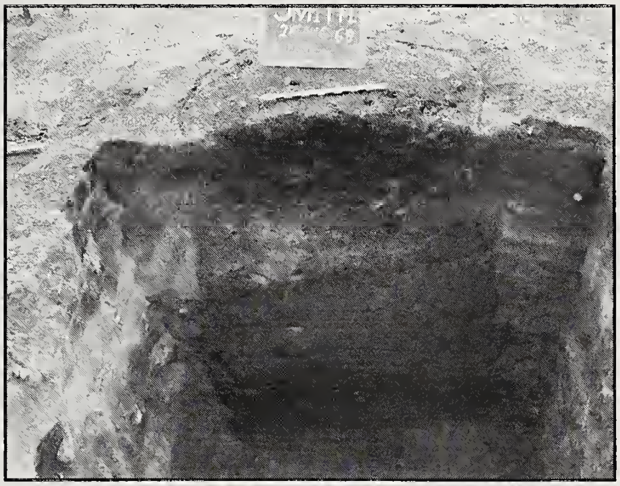


Figure 35. Photograph of cross-sectioned storage pit, Feature 52, Smith-Pagerie site.

ing was chiefly confined to pits, rather than hearths. Some of the pit strata were boldly marked by intense color, ranging from gray to black, red, brown, and yellow. Generally, the most complexly stratified pits produced the largest amounts of artifacts and other refuse, and within this group, the darkest, most organic-rich layers tended to be most productive.

As argued for pits in the Klock site report, the fate of pit features after Native American occupation ceased at the Smith-Pagerie site needs to be addressed. How did so many get filled up before abandonment of the village and the onset of unprotected exposure to the forces of nature? Why are there no cases of pits that appear to have been empty upon abandonment then filled up by collapse, rainwash and soil build-up? To some degree, we may not be able to recognize pits resulting from this scenario. But this can apply only to a small percentage of pits. A clue may be found in the analysis of sufficiently exposed house patterns. Houses fully occupied by Mohawk families may have contained more midline pits than sparsely occupied houses, because as pits became filled up with refuse, there were no places for families in fully occupied houses to dig fresh pits except along the aisles. Such midline pits occurred within at least seven of the houses identified at Smith-Pagerie. Another place where families could dig new pits would be in the open areas outside houses. There were only a few such pits within excavated portions of the Smith-Pagerie site. In most or

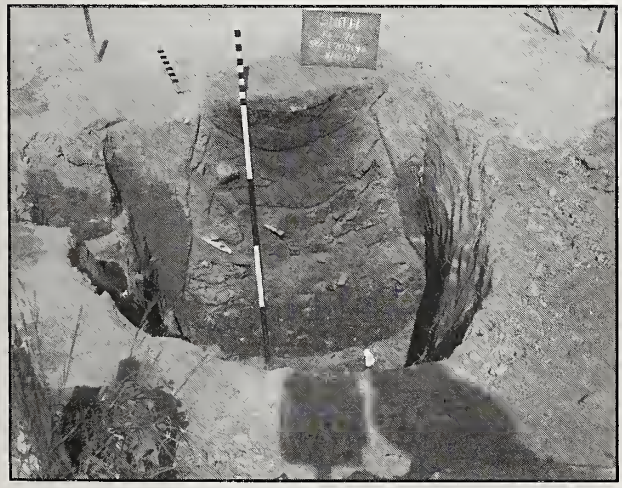


Figure 36. Photograph of cross-sectioned storage pit, Feature 76, Smith-Pagerie site.

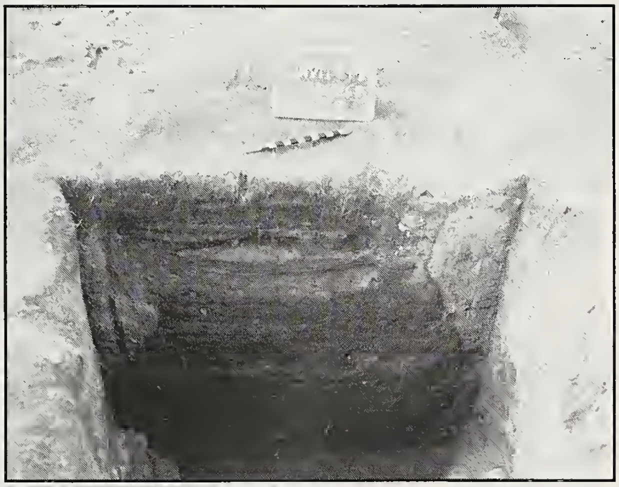


Figure 37. Photograph of cross-sectioned storage pit, Feature 40, Smith-Pagerie site.

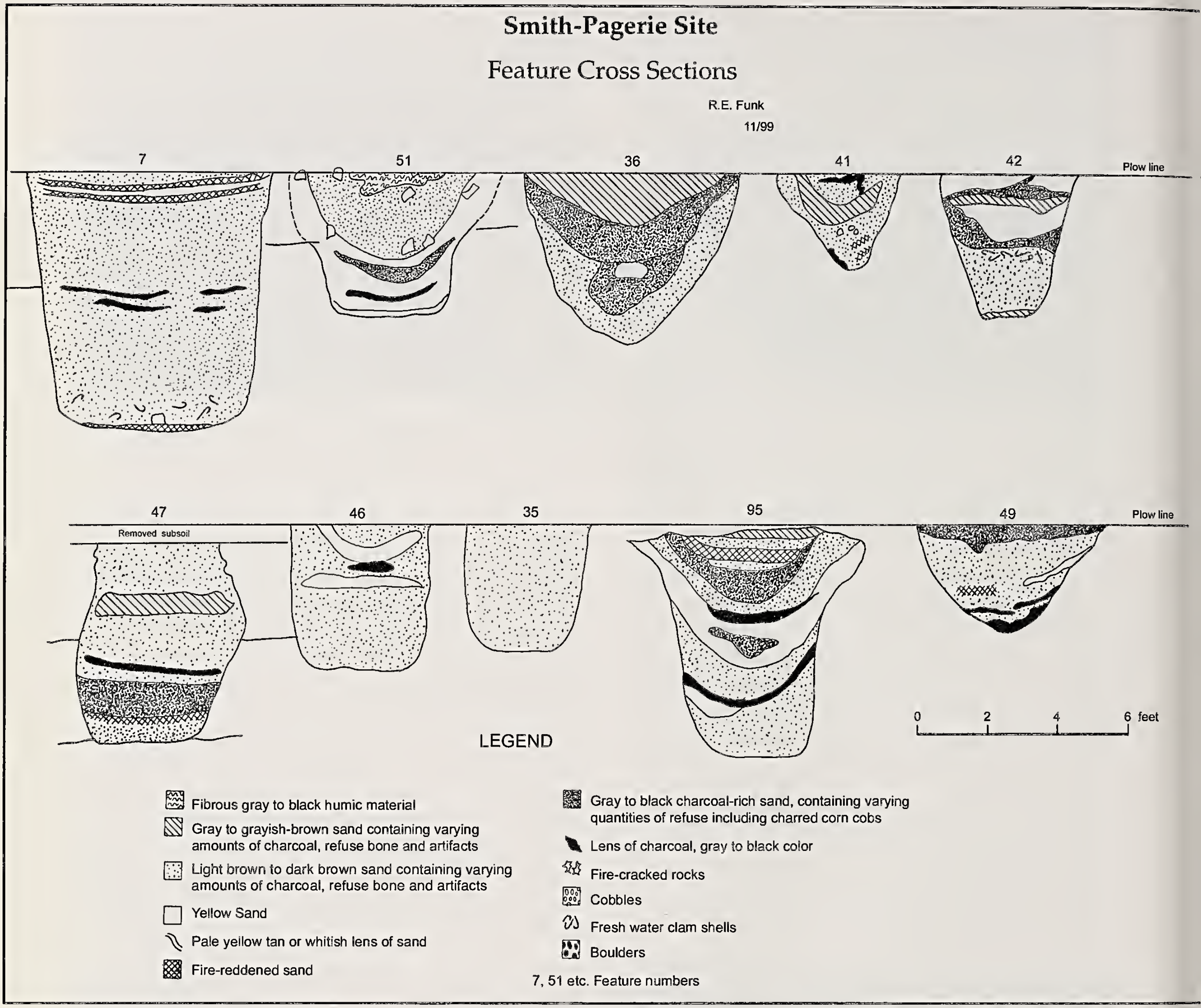

Smith-Pagerie Site
Feature Cross Sections
R.E. Funk
11/99
7
51
36
41
42
Plow line
47
Removed subsoil
46
35
95
49
Plow line
0
2
4
6 feet
LEGEND
Fibrous gray to black humic material
Gray to grayish-brown sand containing varying amounts of charcoal, refuse bone and artifacts
Light brown to dark brown sand containing varying amounts of charcoal, refuse bone and artifacts
Yellow Sand
Pale yellow tan or whitish lens of sand
Fire-reddened sand
Gray to black charcoal-rich sand, containing varying quantities of refuse including charred corn cobs
Lens of charcoal, gray to black color
Fire-cracked rocks
Cobbles
Fresh water clam shells
Boulders
7, 51 etc. Feature numbers

Figure 38. Graphic showing drawn profiles of cross-sectioned features Smith-Pagerie site.

all cases, pits that seemed isolated may actually have pertained to the interiors of houses that could not be observed in areas of limited excavation. The number of pits outside houses appears to be far fewer at Smith-Pagerie than at the Klock site.

Excavated features number 81, or 53.6 percent of the total of 151. Pits produced the majority of artifacts, debitage, refuse bone, charred corn, squash, and nuts recovered at the site. Hearths were far less productive. Given time constraints, some pits were only half excavated then backfilled. Some artifacts and ecofacts were occasionally recovered from the tops of features after removal of the plow zone, even though they were not intentionally excavated. Relatively little material was found in the plow zone.

ARTIFACTS

The Smith-Pagerie site produced an artifact assemblage of 15,008 objects. Eighty-three percent of the collection is composed of pottery fragments, and chipped stone makes up 16 percent. Ceramic pipes, rough and ground stone tools, shell, and bone artifacts are present in smaller numbers. One tubular brass bead and one iron artifact are the only European trade items discovered on the site. A complete trait list is presented in Table 14.

Table 14. Smith-Pagerie Site Trait List

Ceramics	
Pottery	
Complete rim sherds	386
Incomplete rim sherds	1,401
Decorated neck and shoulder sherds	94
Undecorated neck and shoulder sherds	1,129
Plain body sherds	9,231
Check stamped body sherds	92
Juvenile fragments	63
Chunks of potter's clay	21
Chunks of fired clay	2
Pipes	
Stem fragments	10
Bowl fragments	1
Juvenile fragments	2
Chipped Stone	
Projectile Points	
Triangular	
Whole	46
Fragmentary	41
In process	1
Other	
Fox Creek stemmed?	1
Jack's Reef pentagonal?	1
"Fishtail"	1
Notched or stemmed	1
Other Bifaces	
Knives, bifacial	
Leaf-shaped "Iroquois"	4
Ovate	6
Bifaces, fragmentary (possible knives)	5
Bifaces, in process	23
Scrapers, bifacial	3
Drill?	1
Strike-a-light?	1
Debitage	
Cores, flakes (not sorted)	2,307
Rough Stone	
Hammerstones, cobble	13
Hammer-anvilstones, cobble	
Single pit	10
Two pits	10
Hammer-anvil-mullers	2
Anvilstones, cobble	2
Hammer-mulling stone, cobble	1
Pestles	2
Ground Stone	
Celts	24
Celt in process	1
Adzes	2
Beads	12
Other Stone	
Quartz crystals (Herkimer diamonds)	4
Chunks of feldspar	1

Continued on next page

Table 14—Continued

Bone and Antler	
Perforated deer phalanges	16
Awls	13
Worked or polished bone fragments	6
Bone fleshers	3
Worked beaver incisors	2
Antler tine flakers	1
Bone pendants	1
Teeth pendants	1
Antler effigy	1

Shell	
Tubular beads	1
Worked shell	1

European Goods	
Tubular brass or copper beads	1
Iron objects	1
Ceramics (intrusive)	3
Kaolin pipes (intrusive)	1
Cut nails (intrusive)	6
Glass (intrusive)	1

Pottery

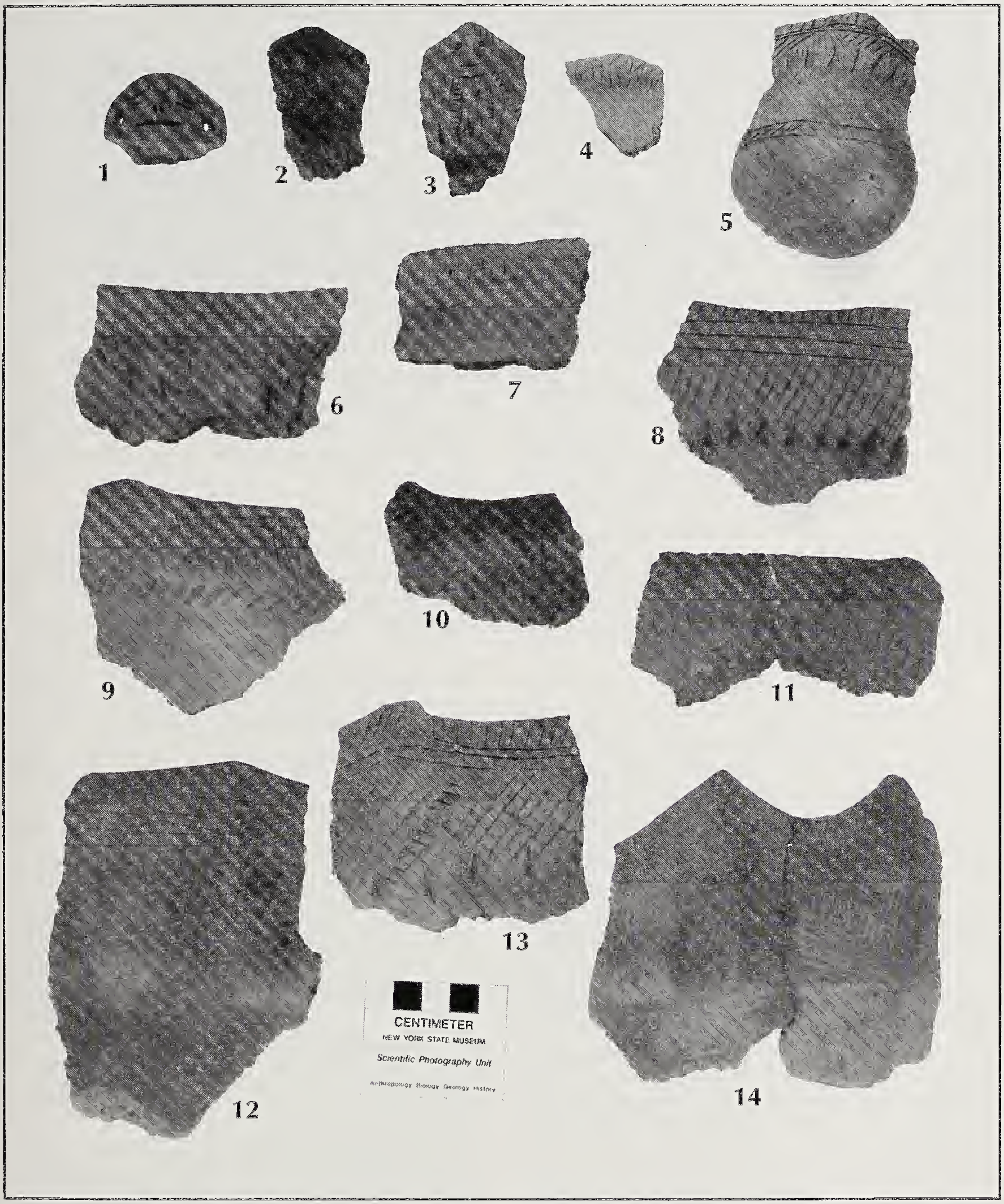
In total 12,396 sherds of pottery were recovered during excavations at the Smith-Pagerie site, a sample comparable in size to the New York State Museum's collections from the related Garoga and Klock components. In virtually all respects the ceramics from these sites are remarkably similar. This thin-walled, feldspar-tempered, and finely made pottery was constructed in a globular form with plain but carefully wiped body surfaces.

Pots usually display a distinctive collar decorated with incised geometric motifs (Figure 39, Nos. 2–6, 8–14; Figure 40); however, collarless thickened lip varieties comprised a minority form on all three sites (Figure 39, No. 7). Given the abundant remains of ceramics all over these sites, the production of this ware must have been an important and frequent activity in Mohawk villages.

Ample evidence of pottery production was recorded at the Smith-Pagerie site. Six excavated storage pits produced numerous large chunks of cured clay, undoubtedly stored for future use in ceramics manufacture. Similar finds of prepared clay stored for future use have been recorded at other Iroquoian sites (Witthoft and Kinsey 1959:43). One rectangular strip of hardened clay was also discovered at the Smith-Pagerie site; the striations across the flat surface of this object suggest that it was used to wipe the surfaces of clay vessels before they were fired.

Another feature produced a large (407 g) chunk of feldspar that would have provided raw material for temper. Virtually all Mohawk ceramics are tempered with crushed plagioclase feldspar, probably because of the advantageously low thermal expansion rate of this material (Prezzano 1985:119–120). Feldspars are the most common minerals that are stable at low firing temperatures (Shepard 1968:28). In New York they originate in the Adirondacks and occur sporadically in glacial tills throughout the state. They are also easily identified and could be collected from local stream beds for use in pottery manufacture (Prezzano 1985:122). The platy characteristics of plagioclase feldspar probably enhanced the strength of Mohawk pottery. Shepard (1968:27) suggests that because such materials were forced into parallel position in the forming and finishing process, they may have had a reinforcing effect against cross fracture. Although this same pattern would have caused weakness in the parallel plane, this would not have caused a serious problem in the relatively thin-walled ceramics of Iroquois pottery, but it may explain the spalling that is frequently observed in the thicker rim sherds of Iroquois ware. Black plagioclase feldspar is the dominant tempering agent in all the Smith-Pagerie pottery. No exotic tempers or shell tempering occurs in the assemblage.

The process of pottery firing employed by the Iroquois has been difficult to replicate experimentally (Witthoft and Kinsey 1959:53) or discover archaeologically (Kapches 1994:91). It is known that they lacked kiln technology, but the alternate methods employed are not well understood. At the Smith-Pagerie site the discovery of the bottom of an entire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CENTIMETER
NEW YORK STATE MUSEUM
Scientific Photography Unit
Anthropology Biology Geology History

Figure 39. Ceramics from the Smith-Pagerie site. Key: 1, human face effigy from a pipe bowl; 2, 3, human face effigies from vessel castellations; 4, 5, juvenile pots; 6, 8, 12, 13, rim sherds of Garoga Incised type; 7, rim sherd of Rice Diagonal type; 9, 10, 14, untyped unique rim sherds; 11, rim sherd of Martin Horizontal type.

pot inverted and partially embedded in a layer of sterile sand appears to record in situ an example of the pottery-firing process employed by the Iroquois. Evidence for the firing of pottery in heated beds of sand has been discovered at other Iroquois sites; however, this is the first example recorded for the Mohawk.

Occasional maintenance of finished ceramics is evident by a few examples of cracked pots that were repaired. The technique involved drilling a hole through the fired pot on either side of the crack and binding the break together, thereby extending the use-life of the vessel (Wray 1973:12). An unusual find at the Smith-Pagerie site included five large rim sherds from an Otstungo Notched vessel that fit together to form the entire rim of a pot. Six paired drill holes at the edges of the broken sherds indicate that the rim of the vessel was cracked and repaired in at least three different places before it was ultimately discarded. Although Varley (1993:86) has argued that large vessels may have been mended rather than discarded more often than small vessels, this Otstungo Notched vessel was a small pot (see below). Two other sherds in the collection also have drill holes, showing that this type of repair was used on other vessels as well.

The uniformity of Mohawk pottery in form, style, and construction technique is indicative of a long-standing craft tradition requiring considerable training. The production of pottery has been generally ascribed to Iroquois women (Sagard 1939:109) who probably worked in household cohorts producing pottery and also training young girls in the skills of their craft. The archaeological evidence of this learning process includes the common occurrence of poorly made and poorly fired sherds, which can be attributed to the work of juveniles. Sixty-two examples of such work were recorded for the Smith-Pagerie site, including examples that mimic collared and thickened lip pot varieties. Crude incised motifs on the rims of many of these sherds represent initial attempts to master the Mohawk design vocabulary. Also related to these juvenile sherds was the discovery of a small, poorly made toy clay spoon at the Smith-Pagerie site.

Iroquois pots ranged widely in size from small, hand-held juvenile pots (Figure 39, Nos. 4, 5) to tall storage vessels. The majority of the thousands of sherds recovered from the Smith-Pagerie site were too small and fragmentary to provide an indication of pot size; however, the curvature of some of the larger rim sherds suggests that a full range of pot sizes was present in the assemblage. Three complete vessel rims could be reconstructed from sherds that fit together, including a Garoga Incised rim reconstructed from 11 sherds, a Garoga Incised rim reconstructed from 8 sherds, and an Otstungo Notched rim reconstructed from 5 sherds. All three rims were square in shape with sides that bowed out slightly. Both of the collared Garoga Incised rims had four low castellations, one at each corner. The circumferences of the three rims were 90, 41, and 50 centimeters, respectively. Vessel volumes, calculated from rim diameters (Whallon 1969:90), were 18.8, 3.5, and 6.3 liters. Measurements of 222 rim sherds from the nearby Garoga site indicated an average volume of 7.1 liters for the pots from that village. None exceeded 26 liters in size (Whallon 1969:92–93, 95).

Complete decorated rim sherds from the Smith-Pagerie site were analyzed using pottery types defined by Lenig (1965:5–8). The results are listed in Table 15.

Table 15. Klock Site Rim Sherds Listed by Type

Pottery Type		*N*	**% of Total**
Collared	Chance Incised	0	0.0
	Deowongo Incised	3	0.8
	Garoga Incised	284	73.6
	Wagner Incised	22	5.7
	Martin Horizontal	5	1.3
	Cromwell Incised	4	1.0
	Thurston Horizontal	1	0.2
	Other	13	2.1
Collarless	Otstungo Notched	30	3.4
	Rice Diagonal	24	6.2
Total		386	100

The pottery type analysis presented here was conducted by Kuhn on complete rim sherds in the entire New York State Museum collection from the Smith-Pagerie site. It should be noted that Snow (1995:177) presents type data from Smith-Pagerie and also references Kuhn, but this attribution is incorrect. The type data from Smith-Pagerie published by Snow were actually collected by William Engelbrecht for his doctoral research using the John Swart collection

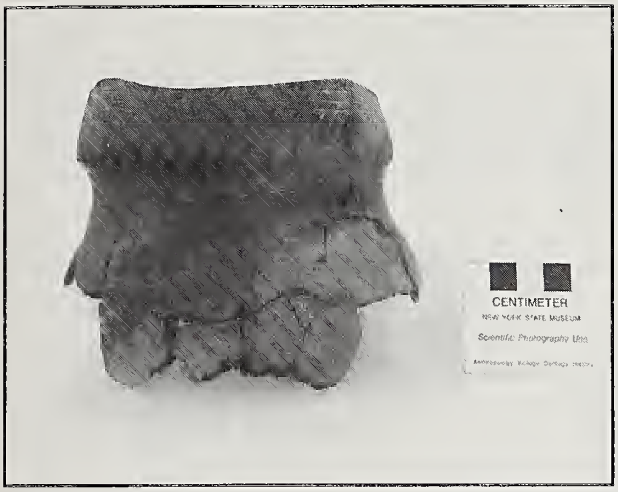

Figure 40. Partially restored collared, incised pottery vessel of Garoga Incised type, from Smith-Pagerie site.

and the New York State Museum collection (Engelbrecht 1971:114). Engelbrecht graciously shared his data with Kuhn for his attribute analysis studies (Kuhn and Bamann 1987; Kuhn 1994), and Kuhn tabulated Engelbrecht's type counts for use in Snow's volume.

Two rim sherds in the Smith-Pagerie site assemblage have human face effigies modeled under pointed castellations. Like those from the Klock site, the first effigy is a simple, very stylized motif consisting of three impressions representing eyes and a mouth. The second example is more elaborate, employing large punctates for eyes, a series of short vertical lines between two horizontal lines for a mouth, and two series of short horizontal lines between two vertical lines for a very stylized body. The latter motif, employing what are sometimes referred to as cross-bars (Beauchamp 1898:94–95), is a quite common stylized form for the human body on this type of effigy.

The presence or absence and the form of human face effigies in the ceramic medium are good chronological indicators for the Mohawk, and they follow a trend similar to that described for the Onondaga (Bradley 1987:55) and Seneca (Wray 1973:12). Excluding pipes, which appear to follow a separate design tradition, the presence of human face effigies in clay (pots, maskettes) is largely restricted to the sixteenth and seventeenth centuries. These types of artifacts are absent on fifteenth-century sites, as well as post-1650 historic period occupations in the valley. The height of their frequency and popularity was from 1590 to 1630 (Beauchamp 1898:92).

Designs on Mohawk pottery were not confined to collars. Neck and shoulder decorations were also components of the Mohawk pottery design tradition. Although examples of decorated necks were largely absent in the collection of sherds from the Smith-Pagerie site, 94 examples of decorated shoulder sherds were recorded. All of the shoulder sherds were rounded. There were no carinated sherds in the assemblage. Many of the shoulder sherds were small and fragmentary with bits and pieces of decoration, but a small percentage was large and complete enough to accurately type. These were categorized according to types defined by Lenig (1965:11), and are listed in Table 16.

Table 16. Klock Site Shoulder Sherds Listed by Type

Motif	*N*	% of Total
Incised horizontal banded	21	46
Oblique punctuation	12	26
Incised triangular plats	11	24
Open Reed Punctation	2	4
Total	46	100

The number of horizontal incised lines used in the Incised Horizontal Banded motif can vary from pot to pot but usually ranges between two and eight lines (Lenig 1965:11). A study of this variability has never been made but could be informative, given the fact that the number of horizontal border lines on Mohawk rim motifs has been shown to be chronologically sensitive (Kuhn and Bamann 1987:44). Figure 41 presents the distribution of horizontal lines for 21 Incised Horizontal Banded shoulder sherds from the Smith-Pagerie site.

The two shoulder sherds listed in Table 16 as Open Reed Punctation are unique specimens in the Smith-Pagerie site collection that do not fit into any defined category of Mohawk shoulder design. The first example has three horizontal rows of large circular punctations produced by impressing the end of a hollow reed or bone into the soft clay of the unfired vessel. The second example has two single rows of open reed punctates bordered by single horizontal lines above and below and separated by a field of deep and boldly incised oblique lines. Along with a number of collared rims with motifs employing open reed punctates, these shoulder

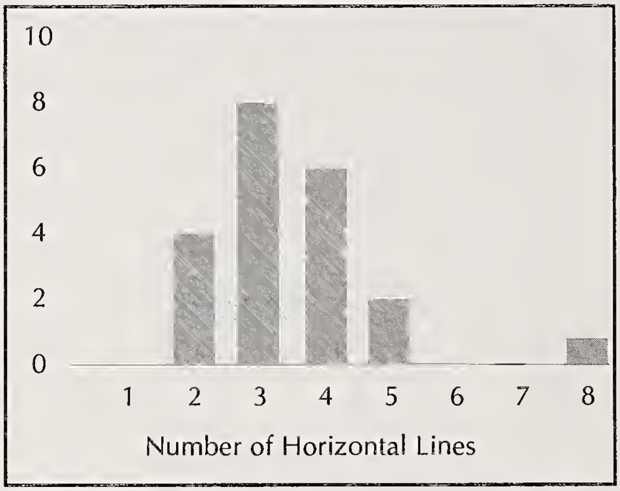

Figure 41. Distribution of horizontal lines for Incised Horizontal Banded type shoulder sherds from the Smith-Pagerie site.

sherds suggest some type of interaction between the Mohawk and the St. Lawrence Iroquoians (Kuhn, Funk, and Pendergast 1993).

Eight complete rim sherds in the Smith-Pagerie site assemblage extended below the neck and shoulder, allowing correlation of rim and shoulder motifs. Two of these sherds were Garoga Incised rims with Oblique Punctation (single row) shoulders. Two were Garoga Incised rim sherds with Incised Horizontal Banded shoulders (one with two and one with three horizontal lines between single rows of punctates, each matches the number of horizontal border lines at the top of the collar motif). One was a thickened lip Rice Diagonal vessel with a shoulder decorated with Oblique Punctations (single row), and one was a Garoga Incised vessel with Incised Triangular Plats on the shoulder. On the latter, the pattern of filled triangles on the shoulder closely matched that on the collar. Lenig (1965:11) has noted that this type of equivalence occurred frequently on Mohawk pots. Finally, two Garoga Incised sherds had shoulders that were undecorated, showing that not all collared Mohawk pots had shoulder decoration.

Little can be said regarding the large number of plain body sherds present in the Smith-Pagerie site assemblage. Ninety-two body sherds were check stamped. The Smith-Pagerie site has the largest number of check-stamped body sherds so far recorded for any late Mohawk site, but even here the application of this technique of decoration did not exceed 1 percent of the total number of body sherds.

Ceramic Pipes

The small sample of ceramic pipes recovered from the Smith-Pagerie site comprised 10 pipe stems, 1 pipe bowl, and 2 juvenile pipe fragments. All of the pipe stems are round in cross-section and undecorated.

The single pipe bowl is an effigy pipe, which bears the stylized depiction of a human face (Figure 39, No. 1). This rare find was discovered in Feature 54, a large and deep pit in House 1. The pipe was excavated from a black, charcoal-stained soil strata, 2 feet below the surface of the pit. Although it is identified in the artifact catalog as a ceramic ornament, the curvature of the obverse clearly indicates that it is a fragment of a smoking pipe. The holes in the artifact were drilled after firing. This would seem to suggest that the effigy was converted into a pendant or ornament after the pipe had broken.

The style of the effigy, with its recessed face, deeply punctated mouth and nostrils, and bulging eyes, is highly unusual. The authors are unaware of any other pipe like it from Mohawk sites. The facial characteristics are remarkably similar to a Seneca pipe from the Richmond Mills site, but the Mohawk example is much smaller in size. There may be other singular examples of the style in Iroquoia.

Another unique characteristic of this pipe is its tempering. The artifact is evenly tempered with sand-sized particles that are milky white or clear, perhaps quartz or quartzite. Black feldspar, which is ubiquitous in Mohawk ceramics, is not present. Of the hundreds of pottery and pipe fragments in the Klock, Smith-Pagerie, and Garoga assemblages, there is no other example with tempering similar to this pipe. This raises the possibility that this human effigy pipe may be an exotic that was acquired by the Mohawk through trade or exchange. Regarding the stylistic similarity to the Seneca pipe from Richmond Mills, it is worth noting that the tempering of the Mohawk specimen is also very different from this and other Seneca pipes familiar to the junior author.

Two small and poorly fired examples of juvenile stems complete the ceramic pipe assemblage.

Projectile Points

Projectile points are well represented in the artifact assemblage. Ninety examples were recovered during excavation of the site: 46 complete specimens, 43 point fragments, and 1 point in process. Small and

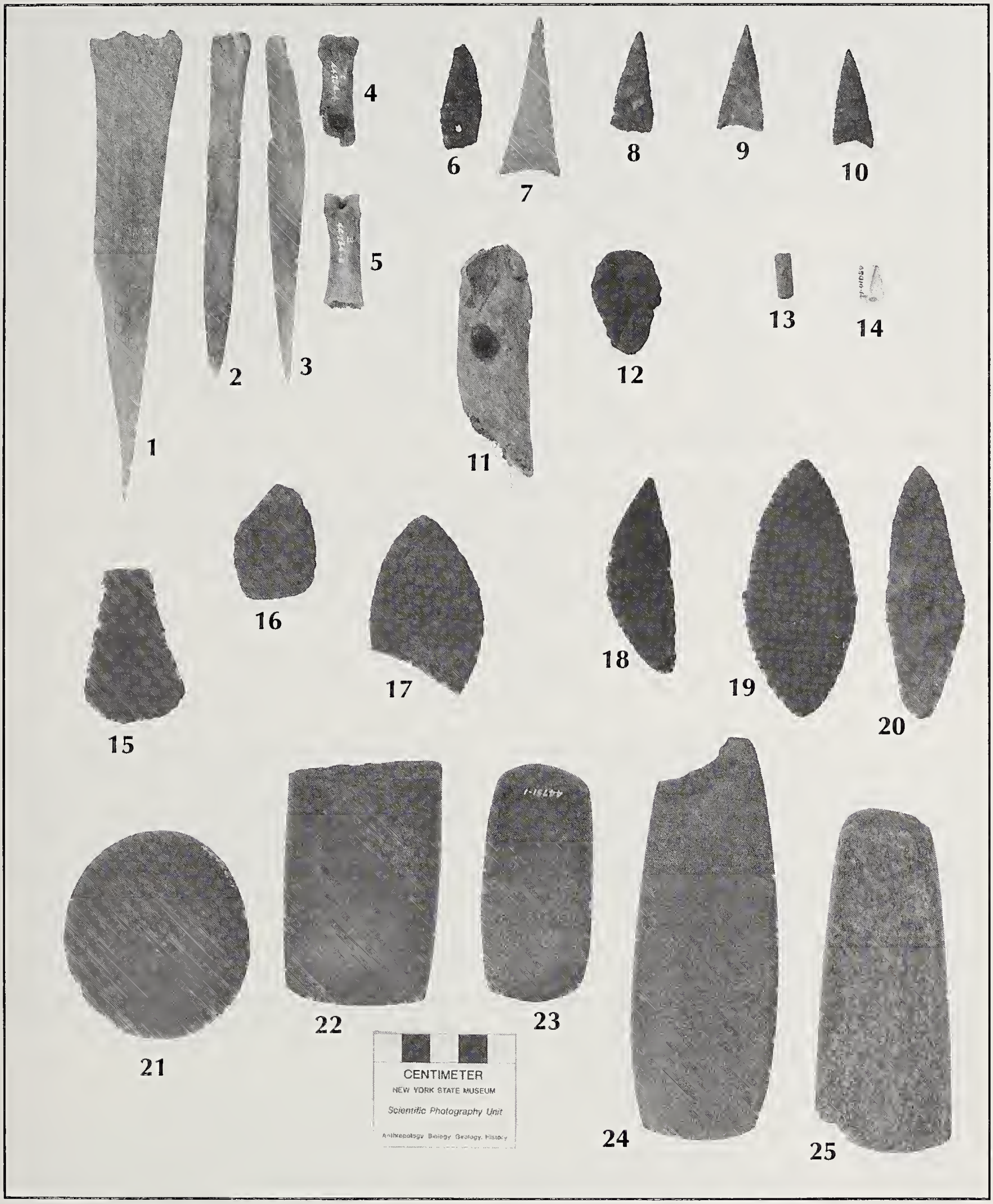
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Figure 42. Photograph of stone, bone, shell, and metal artifacts from the Smith-Pagerie site. Key: 1–3, bone awls; 4, 5, perforated deer phalanges; 6, iron projectile point; 7–10, chipped stone projectile points of Madison type; 11, antler maskette; 12, possible bifacial scraper; 13, tubular brass bead; 14, tubular shell bead; 15, retouched flake tool; 16, ovate biface knife; 17–20, bipointed "Iroquoian" biface knives; 21, cobble anvilstone; 22, 25, ground and polished celts; 23, grooved celt; 24, ground and polished adze. Lithic materials: 7, brown jasper; 8–10, 12, 15–17, 19, 20, central Onondaga chert; 18, Leray chert; 21, quartzite; 22–25, basalt.

triangular in shape, nearly all of the triangular specimens fall well within the range of variation defined by Ritchie (1971:33–34) for the Madison projectile point type (Figure 42, Nos. 7–10). Except for a few examples, all of the points were manufactured from gray central-Onondaga chert. Descriptive statistics for the sample of complete projectile points are provided in Tables 17 and 18. The sample is quite similar in many respects to a sample of 69 Madison points recovered from the nearby Klock site. A broader study of Mohawk projectile points has been completed by Kuhn (1996).

Table 17. Descriptive Statistics for Complete Madison Points from the Smith-Pagerie Site

Attribute	*N*	Mean	Range	Standard Deviation	Coefficient of Variation
Maximum length	46	31.4	17.5–56.0	5.9	18.8
Maximum width	46	17.3	13.0–26.0	2.7	15.6
Maximum thickness	46	5.6	3.0–9.0	1.8	32.1
Maximum weight	31	1.984	1.0–3.8	0.73	36.8

Note: Measurements in millimeters, weight in grams.

Table 18. Base Shape and Side Shape Attributes for the Smith-Pagerie Site Projectile Points

Base Shape	% of Total	Side Shape	% of Total
Concave	74	Straight	54
Straight	26	Excurvate	33
Convex	0	Incurvate	9
		Irregular	4

The projectile point assemblage exhibits a narrow degree of uniformity. As such, the unusual characteristics of one particular point are worthy of note. This specimen is a finely crafted point of glossy tan jasper (Figure 42, No. 7). With a length of 56 millimeters, it is not only much larger than any other point recovered from the Smith-Pagerie site, but also larger than any of the 69 complete projectile points in the assemblage of the nearby Klock site. The size of the point and its exotic material, combined with the fact that it is very thin and carefully flaked, suggest that the artifact may have been a ceremonial object rather than a functional tool. It has been noted for the Seneca sequence that unusually long points were often found in burials, suggesting a ceremonial association (Navias 1995:31).

A small number of nontriangular points occurred on the site. These include a broad corner-notched point similar to the Brewerton Corner-Notched type, a pentagonoid point resembling the Jack's Reef Corner-Notched type, a broad-stemmed point similar to the Fox Creek Stemmed type, and a fishtail-like point that is probably a somewhat aberrant triangular point in process. As in the case of nontriangular points from the Klock site, the senior author feels these scattered finds represent brief visits to the location by pre-Iroquoian peoples. The junior author, however, believes it likely these objects were deliberately collected for symbolic and ceremonial reasons.

Examination of the Smith-Pagerie site chipped stone points at low magnifications (5–25) showed very little evidence of wear resulting from use on various materials in various tasks. Four of the Madison points displayed heavy grinding, slight rounding/ gloss, slight edge-crushing, and slight edge-nibbling on lateral edges, respectively.

Other Chipped Stone Artifacts

The range of other chipped stone artifacts recovered from the Smith-Pagerie site is typical of late prehistoric and protohistoric Iroquoian occupations. In addition to the numerous projectile points, a smaller number of knives, miscellaneous bifaces and biface fragments (including 23 bifaces in process), and a few other chipped stone tools are tabulated in the trait list (Table 14). Six of the knives are of the classic leaf-shaped or bipointed form often found on

Iroquoian sites (Figure 42, Nos. 17–20), and the other four are ovate or lanceolate (No. 16). There are only three scrapers (No. 15) and one possible strike-a-light (No. 13), and these were modified from bifaces in the assemblage. No unifaces were recovered in the excavations. Descriptive statistics for bifaces, Iroquois knives, and ovate knives are presented in Tables 19 through 21.

Table 19. Summary Statistics for Stage-1 Bifaces from the Smith-Pagerie Site

Statistic	Length	Width	Thickness	Weight
Mean	45.6	28.9	13.3	21.4
Median	47.5	28	13	27
Mode	N/A	22	14	N/A
Standard deviation	13.13	6.8	4.3	10.6
Range	38	22	15	25.5
Minimum	25	20	7	3.5
Maximum	63	42	22	29
N	8	13	13	5

Note: Measurements in millimeters, weights in grams.

Table 20. Summary Statistics for "Iroquois Knives" from the Smith-Pagerie Site

Statistic	Length	Width	Thickness
Mean	80	33	8.1
Median	81	33.5	8
Mode	N/A	N/A	8
Standard deviation	10.7	8.3	1.03
Range	22	17	2.5
Minimum	68	24	7
Maximum	90	41	9.5
N	4	4	4

Note: Measurements in millimeters.

Table 21. Summary Statistics for Ovate Knives from the Smith-Pagerie Site

Statistic	Length	Width	Thickness	Weight
Mean	37	27.3	8.4	7.9
Median	37	27	8	7.75
Mode	N/A	26	8	N/A
Standard deviation	2.74	2.0	1.77	1.18
Range	7	6	6	2.8
Minimum	33	24	6	6.7
Maximum	40	30	12	9.5
N	5	8	8	4

Note: Measurements in millimeters, weights in grams.

Ovate knives and bifaces in process show few examples of wear, evinced on four specimens as edge nibbling, rounding/gloss on broad end, rounding/gloss on lateral edge, and heavy (Level-8) blunting and rounding on the tip, respectively. Two of the biface scrapers show slight edge nibbling.

More than 2,300 examples of wastage associated with the lithic reduction process were also identified, including large numbers of waste flakes with edge wear typical of utilization. An analysis of this large and undoubtedly representative inventory of Mohawk chipped stone tool production could prove informative; however, an undertaking of this type was deemed beyond the scope of the present project.

Chert Source Materials

As at the Garoga and Klock sites, the vast majority of chipped stone artifacts at the Smith-Pagerie site were manufactured from gray Onondaga chert. Although outcrops of Knauderack (Little Falls dolomite) chert were located within 3 to 5 kilometers, the inhabitants of these sites preferred to travel 15 to 25 kilometers south to procure their lithic raw materials, presumably because the higher-grade Onondaga chert was superior for knapping. These Onondaga outcrops are well to the south of the core area of Mohawk occupation, but Mohawk hunting and fishing stations are known for this region and junkets to these sites may have functioned as opportunities for lithic procurement.

Knauderack chert is represented in the assemblage by five flakes, and eight specimens from Onondaga outcrops farther east toward the Hudson Valley were also noted in the collection. These numbers are miniscule in the total assemblage of more than 2,300 chipped stone artifacts, and the exploitation of these sources does not appear to have been an important component of the Mohawk lithic procurement strategy.

There are two categories of exotic cherts in the assemblage. The first is a single example of jasper represented by the unique projectile point discussed above. A lustrous yellow-tan in color, this material appears to be an example of Berks/Lehigh jasper, which occurs in numerous outcrops along a ridge extending through Berks, Lehigh, and Bucks Counties in southeastern Pennsylvania (Fogelman 1983:16). The most likely route of entry of this material into New York would be up the Susquehanna River, leading to the suggestion that this specimen may be indicative of some type of interaction between the Mohawk and the Susquehannock. However, the Susquehannock rarely exploited these Berks/Lehigh jasper sources, relying instead on local white quartz or gray chalcedony for their chipped stone tools (Bradley 1987:98; Kent 1989:156). Examples of these quartzes or chalcedonies are completely absent in the Smith-Pagerie site assemblage. Mohawk access to jasper may need to be explained through some other avenue of trade or procurement.

Identifying the source of native lithics based on the macroscopic characteristics of artifacts is often problematic (Kuhn and Lanford 1987:58), and the possibility of alternative sources for this material cannot be discounted. Mustard-colored jaspers from the Canadian Shield have been recorded from late prehistoric Iroquoian sites in southeast Ontario (Reed 1993:24), and jaspers may have made their way into New York from this direction rather than from the south.

The second category of exotic lithics at the Smith-Pagerie site includes five examples of LeRay chert: two complete projectile points, one complete lanceolate knife, and two flakes. These chert specimens are black with a glossy luster and a degree of translucence, particularly along thinly flaked edges. The material is available from outcrops in Jefferson County, New York (Hotopp 1991:48). Chipped stone tool inventories from St. Lawrence Iroquois sites in this area include a high percentage of artifacts produced from this type of chert (Hotopp 1991:49); however, these rarely included chert projectile points, because the Jefferson County Iroquois tended to rely primarily on bone points during this period (Tuck 1971:206). Along with the St. Lawrence Iroquois pottery at the Smith-Pagerie site, these exotic lithics probably relate to the dispersal of the Jefferson County St. Lawrence Iroquois, which appears to have occurred prior to ca. A.D. 1580 (Kuhn, Funk, and Pendergast 1993; Pendergast 1985:35).

Rough Stone Artifacts

The most frequently occurring rough stone tools in the Smith-Pagerie site assemblage were hammerstones and hammer-anvilstones made from water-worn cobbles. Many of these implements are pitted, and some may have served a dual purpose as nutting stones. There are 13 hammerstones, 20 hammer-anvilstones, 2 anvilstones (Figure 42, No. 21), 1 hammer-muller, 2 hammer-anvil-mullers, and 2 pestles in the inventory. Of the 20 hammer-anvils, 10 bear a single pit on one face, and 10 bear two pits, one on each face. The predominant rock type used for cobble tools was sandstone (12 items), followed by quartzite (11), gneiss (7), chert (5), metagabbro (2), possibly syenite (2), and granite (1). The chert occurred as spheroidal cobbles that displayed evidence of extensive use for hammering activities. The weight in grams of the cobble tools is summarized in Table 22.

Table 22. Summary Statistics for the Weights of Hammerstones and Hammer-Anvilstones from the Smith-Pagerie Site

Statistic	Hammerstones	Hammer-Anvilstones
Mean	327.5	524.9
Median	233.5	500
Mode	N/A	N/A
Standard deviation	215.67	241.1
Range	650	849
Minimum	150	132
Maximum	800	981
N	12	19

Note: Weights in grams.

As in the case of the Klock site cobble tools, the hammer-anvils are generally heavier than the hammerstones. The weights of the anvilstones (761 and 642 g) and hammer-anvil-mullers (340 and 680 g) fall within those ranges.

Ground Stone Artifacts

Twenty-four celts make up the most common ground stone tool, although only five were complete specimens (Figure 42, Nos. 22, 23, 25). One of these five was grooved in the middle, probably to facilitate hafting onto a wooden handle (No. 23). As Ritchie and Funk (1973:307) note, these cutting and chopping tools must have been very important to the Mohawk, whose longhouses and palisaded villages took hundreds of posts and poles to construct. Two adzes also occur in the inventory from the site (No. 24).

The five complete, or nearly complete, celts were measured and weighed. All of them showed some attrition from battering on poll or bit, so they were originally slightly longer and heavier than the analysis indicates. The lengths and weights are listed in order, as follows: 130 millimeters long, weight 250 grams; 112 millimeters long, weight 350 grams; 114 millimeters long, weight 316 grams; 162 millimeters long, weight 652 grams; 131 millimeters long, weight 538 grams. All celts are made of dense igneous rocks, the most common being black basalt.

One ornamental perforated shale bead completes the ground stone assemblage.

Other Stone Artifacts

In this category are a very large chunk of feldspar, probably used to grind off small flakes and chunks to be used as temper in pottery, and four quartz crystals (Herkimer diamonds).

Bone and Antler Artifacts

Bone and antler artifacts occurring at the Smith-Pagerie site included a small number of cutting, perforating, scraping, and stone-working tools. There were 13 bone awls (Figure 42, Nos. 1–3). Ornamental bone and antler artifacts included numerous perforated deer phalanges (Figure 42, Nos. 4, 5) and fragments of worked or polished bone, as well as 1 perforated and polished bone pendant, 1 highly ground and polished tooth that would appear to be a fragment of a pendant, and 1 large antler pendant carved with the effigy of a human face (No. 11). Not included in the trait list is a single carved bone effigy comb from the site that was in the possession of the property owner. The occurrence of ornamental or ceremonial bone artifacts is a diagnostic characteristic of sixteenth-century Iroquois sites, as is the prominent occurrence of human face effigies executed in a variety of mediums.

Shell Artifacts

Shell artifacts are poorly represented in the collection. One white tubular marine shell bead was noted (Figure 42, No. 14). This bead measured 14 millimeters long with a diameter to the outside of the bead of 9 millimeters. The drill hole through the bead was 4 millimeters in diameter at one end, tapering down to 2 millimeters at the other end. This specimen should not be classified as wampum, because it is large and unpolished, quite different from the small and highly polished beads for which the term is usually reserved. The site also produced a single small example of very highly polished marine shell that would appear to be a fragment of a pendant. Bradley (1987:90) has argued that marine shell was entering Iroquoia at this time from the south and that its presence is an indication of interaction with the Susquehanna Valley.

European Goods

A single rolled sheet brass or copper bead was discovered during the 1968 excavations at the Smith-Pagerie site in Feature 23 at a depth below surface of 7 inches. This small bead is 16 millimeters long and has a diameter of 6 millimeters (Figure 42, No. 13). Brass or copper artifacts are the earliest types of European trade goods to appear in Iroquoia, and these types of ornamental brass beads are good horizon markers for the protohistoric period.

A single piece of corroded iron was also recovered from another pit at a depth below surface of 16 inches. Roughly triangular in shape, this object is 37 millimeters long and 12 millimeters wide at its base. It has a single perforation in the center near the base. One of the long sides of the artifact is partially folded. It seems likely that the object served as a triangular projectile point before it became deformed (Figure 42, No. 6). Tangless, perforated iron points have been recorded from the early-seventeenth-century Mohawk Rice's Woods site (Rumrill 1991:11); however, triangular brass or copper points tended to be more popular among the Mohawk throughout the protohistoric and historic periods.

Intrusive materials in the site assemblage comprise one kaolin pipe bowl, one piece of bottle glass, six nails, and three sherds of historic ceramics. The kaolin pipe bowl has a high heel with no heel mark, and the bowl is decorated with stars and two large nondescript letters. The stem bore diameter is 5/64 of an inch. The specimen is undoubtedly intrusive. Kaolin pipes do not appear in situ on Mohawk sites until ca. 1630 (Rumrill 1991:15–16), and pipes with decorated bowls generally date after 1650 (Bradley and DeAngelo 1981:123–126). The earliest example in Mohawk territory of a stem bore as small as 5/64 of an inch is at the Jackson-Everson site, which dates after 1660 (Kuhn et al. 1986:25, 29). The single piece of intrusive bottle glass is clear, without imperfections, indicating twentieth-century manufacture (Kendrick 1966:63). The six nails are all cut nails with square machine-made heads, indicating a post-1815 date of manufacture (Nelson 1968:7). The historic ceramics are one sherd of annular ware with brown horizontal bands and two sherds of blue transfer-printed ware. Both of these types date no earlier than ca. 1785 and are most typical of the early nineteenth century (Hume 1985:128, 131). The occurrence of nineteenth- and twentieth-century materials on the site is not unexpected, because it has been continuously farmed since the early 1800s.

SUBSISTENCE REMAINS

Charred squash seeds, corn kernels, and eight-row cobs recovered from features at the Smith-Pagerie site are indicative of the horticultural practices of the Mohawk. The abundant remains of fresh-water mussel shell suggest that this resource was also exploited. As with most other Mohawk sites, faunal remains comprised the bulk of the subsistence-related resources, providing evidence of the importance of hunting in the Iroquois diet.

The collection of faunal refuse remains from the Smith-Pagerie site, curated at the New York State Museum, was temporarily loaned to Frank J. Dirrigl, Jr., and Nicholas F. Bellantoni, Department of Anthropology, the University of Connecticut, Storrs, for expert analysis (Dirrigl and Bellantoni 1992).

Dirrigl and Bellantoni examined 1,753 individual bone specimens. This seems a rather small sample from a large, extensively excavated village site, especially in view of the generally good preservation of bone. The analysts quantified bone fragments and elements in units of number of identified specimens (NISP) for all taxonomic categories represented and also noted modifications resulting from butchering, marrow extraction, charring and calcination, and chewing by rodents and carnivores. They did not characterize the sample in terms of minimum number of individuals (MNI).

Twenty-one taxa were identified, seven to the species level. Large mammals were highly represented in the sample. In decreasing order of abundance, the mammals included white-tailed deer (69.3 percent), beaver (17.7 percent), black bear (6.9 percent), domestic dog (4.3 percent), raccoon (1.1 percent), gray squirrel (0.6 percent), and woodchuck (0.1 percent). There were 257 bones that could be assigned only to unidentified mammals of different size categories. Also represented in the assemblage were bony fishes and small and large birds, species not determined. Fresh-water mussels were also abundant at the site but are not included in Table 23.

Bone elements were identified for deer, beaver, and bear. There was a broad distribution of skeletal elements for all three species, indicating that much skinning and butchering of animals occurred on site. The high representation of crania and mandible elements for these mammals suggests that brain and tongue extraction may have been practiced. Feature 8 at the site contained a complete bear skull. The analysis also indicated that both mature and immature deer were hunted, and game taken during all seasons of the year. One percent of the bone sample displayed cut marks, 3 percent of the bones were charred; calcination occurred on 6 percent of the sample. Two fractured deer tibia are suggestive of the type of breakage indicative of marrow extraction. For a detailed discussion of broad trends in Mohawk faunal assemblages and subsistence patterns, see Kuhn and Funk (2000).

Table 23. Smith-Pagerie Site Faunal List, Analysis by Dirrigl and Bellantoni

Species	**Pieces**
Odocoileus virginianus (white-tailed deer)	746
Cervidae (deer and relatives)	109
Canis familiaris (domestic dog)	49
Canidae (dogs and relatives)	4
Procyon lotor (raccoon)	14
Ursus americanus (black bear)	84
Carnivora (carnivores)	1
Castor Canadensis (beaver)	218
Sciurus carolinensis (eastern gray squirrel)	7
Marmota monax (woodchuck)	1
Mammalia (mammals)	28
Mammalia (lg) (large mammals)	145
Mammalia (md-lg) (medium-large mammals)	21
Mammalia (md) (medium mammals)	30
Mammalia (sm-md) (small-medium mammals)	32
Mammalia (sm) (small mammals)	1
Aves (birds)	24
Aves (lg) (large birds)	3
Aves (sm) (small birds)	1
Osteichthyes (bony fish)	3
Vertebrata (vertebrates)	232
Total	1,753

RADIOCARBON DATES

Table 24 lists the dates presently available for the Smith-Pagerie site, obtained by Snow (1995:180). They are both accelerator mass spectroscopic (AMS) dates. Both dates appear to be aberrant, as there is currently no evidence that the site is multicomponent, and all aspects of the artifact assemblage are characteristic of the mid-sixteenth century.

Table 24. Radiocarbon Dates for the Smith-Pagerie Site

Lab Number	**Material**	**Date (yr B.P.)**	**Calibration**[a]
AA-6419	Zea mays	405 +/- 50	1435 (1448) 1493
AA-7405 1482	Zea mays	430 +/- 50	1428 (1441)

[a] **1 sigma (mean [s]) 1 sigma**

CHAPTER 4

THE GAROGA SITE[1]

LOCATION AND SETTING

This large Mohawk village site, type site for the Garoga phase of late prehistoric Iroquois cultural development as defined by Ritchie (1980:317–323), is located in Ephratah Township, Fulton County, New York (18 E538098 N4762695). At the time of excavation, the site was owned by Mr. and Mrs. Wilford E. Sanderson, who resided in Loudonville. At this writing, the site is owned by the children of Mr. and Mrs. Sanderson.

The site occupies the top of a high, steep-sided sandy ridge of late-glacial origin, at a maximum elevation of 920 feet. The ridge rises 150 feet above Caroga Creek which adjoins it on the north and west. On the south and east, the ridge drops precipitously into a ravine. At its southwest end, it is joined to the main body of Murry Hill by a gently sloping saddle. This part of the ridge is also its narrowest; it broadens out considerably toward the middle, narrowing a little again toward the bluntly rounded east end. Abundant evidence of Indian occupation occurs on all parts of the hilltop, an area of 2.5 acres. Considerable refuse also covered the slopes prior to some 90 years of amateur collecting activity, which has virtually exhausted these once-productive overbank dumps. The topography and soils at this location are essentially identical to those described for the nearby Smith-Pagerie site.

INVESTIGATIONS: METHODS AND RESULTS

The site was known to collectors at least as far back as the 1880s. Garoga and a number of other Mohawk sites were the foci of collecting activities by amateur archaeologist and historian S.L. Frey in the 1880s and 1890s (Frey 1898, 1938). Doubtless their archaeological potential became evident soon after they were cleared for farming and plowed. Since that time the hillside dumps, and some of the refuse-filled pits in the village proper, have been much dug over by collectors.

In 1905 limited but systematic explorations were conducted on the site by M.R. Harrington (1905) for the Peabody Museum of Harvard University. No post-mold patterns were recorded, but 51 pits were excavated, one of which contained a burial. In the summers of 1959 and 1960, a number of pits were excavated within a grid established by avocational archaeologists Donald Lenig, Wayne Lenig, and John Swart. Their explicit purpose was to look for evidence of house patterns and to acquire a systematically excavated artifact sample. Several storage pits were mapped and excavated, and a number of post molds were mapped as well.

With the cooperation of Donald Lenig and Swart, William A. Ritchie and the senior author spent a week at the site in the summer of 1960, digging 10 pits and uncovering some lines of post molds. At that time the decision was made to add the site to the major projects subsumed under the settlement pattern study. Permission for this undertaking was generously granted by Wilford E. Sanderson, who had protected the site from large-scale pot-hunting for more than 23 years.

In the summer of 1961, the senior author and his small crew returned to Garoga and excavated a T-shaped trench near the narrowest part of the ridge. Approximately 43 pits were excavated and several fragmentary house patterns exposed. During the 1962 season, several thousand square feet of topsoil were removed, partly exposing three house patterns and completely uncovering the double stockade. The pace of work was accelerated by hiring a backhoe and operator to strip away the topsoil.

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[1] Also identified as Las. 7-4, NYSM 2332, and NYSO-PRHP No. A035-04-0001.

In 1964, with the aid of a front-end loader, nearly 1 acre of the site was exposed. All told, about 1.5 acre of the 2.5-acre site was excavated. Some problems were encountered in delineation of the settlement pattern, because the landowner had requested that several large clumps of volunteer pine trees remain unmolested.

The site was laid out in 10-foot squares. As already indicated, after the clearing of brush and grass, our basic technique consisted of removing the plow zone to expose the yellow sandy subsoil, in which the dark post molds and pits stand out clearly. The great majority of squares was mapped in detail, employing, where feasible, a 5-by-5-foot square grid frame device. Toward the end of the 1964 season, with time running short, it was necessary to map the partial outlines of three longhouses with the plane table and alidade. This meant that many post molds were not individually mapped. Features were shown as dots, but outlines were not drawn. The overall map of the site, modified and updated in 1999, is presented in Figure 43.

A number of post molds in every house wall, and in both stockade lines, were cross-sectioned and their profiles drawn and measured or, in some instances, photographed. Of the more than 460 features found, only 89 could be excavated. Most of them were deep storage pits, cylindrical or conical in form. Each pit was excavated by first digging an adjoining hole in the sand, wide enough to accommodate a worker, and slightly deeper than the base of the pit. Half of the pit was then excavated by troweling in arbitrary levels from the top down. The resulting profile was drawn and usually photographed. Then the rest of the pit fill was removed.

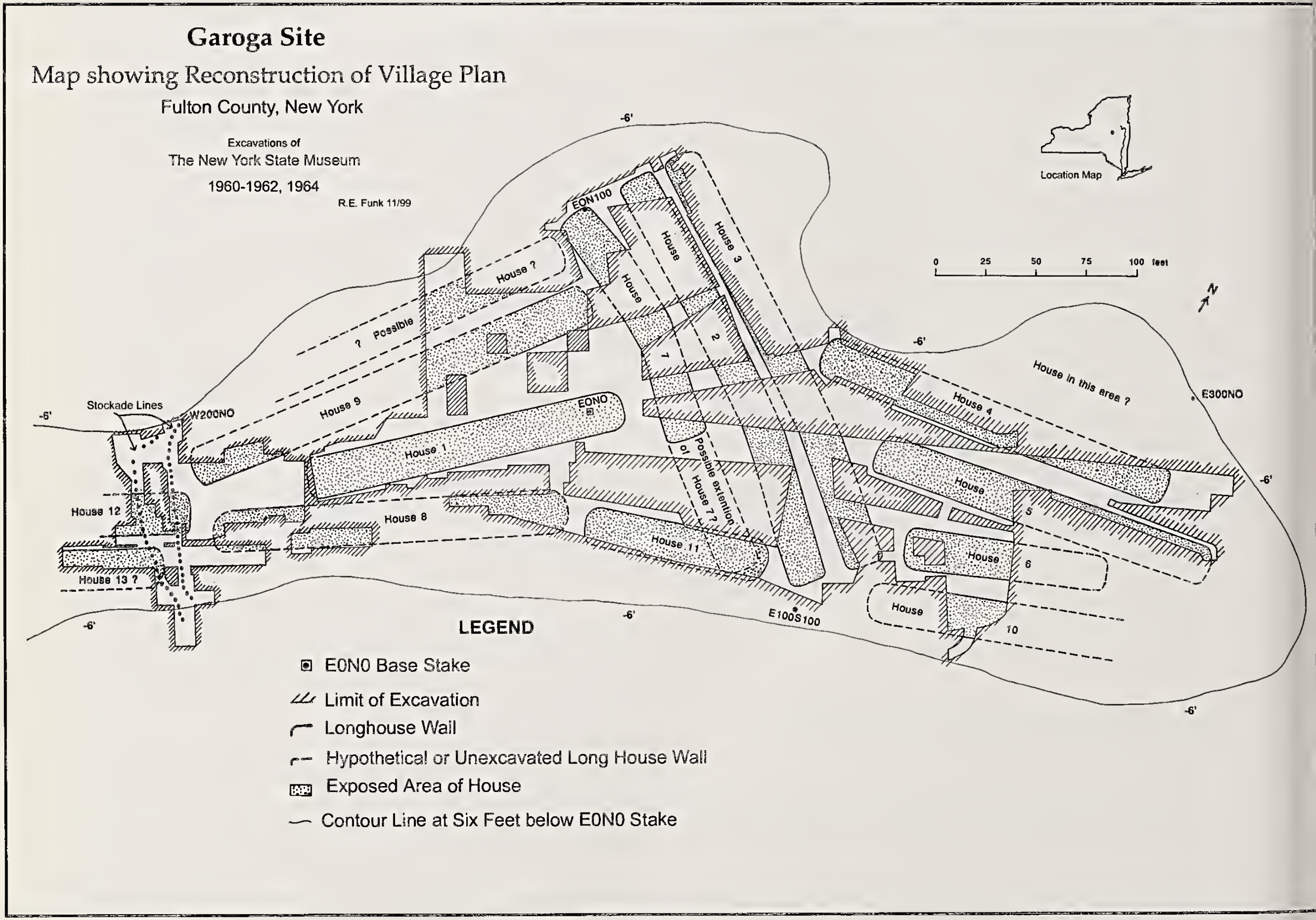
Garoga Site
Map showing Reconstruction of Village Plan
Fulton County, New York
Excavations of
The New York State Museum
1960-1962, 1964
R.E. Funk 11/99
Location Map
0 25 50 75 100 feet
N
-6'
E0N100
House ?
Possible
House 9
House 1
E0N0
House 8
House 11
House 2
House 3
House 7
Possible extension of House 7?
House 4
House in this area ?
House 5
House 6
House 10
E100S100
E300N0
W200N0
Stockade Lines
House 12
House 13 ?
LEGEND
▣ E0N0 Base Stake
Limit of Excavation
Longhouse Wall
Hypothetical or Unexcavated Long House Wall
Exposed Area of House
Contour Line at Six Feet below E0N0 Stake

Figure 43. Map of the Garoga site settlement plan, showing excavated areas, longhouses, and stockades, in relation to local topography.

The plow zone, laced by the roots of pine trees and sumac bushes, averaged 7 inches deep, was dark brown in color, sandy in texture, and moderately rich in refuse such as fire-cracked stones, chert flakes, and artifacts. It was only cursorily examined for artifacts, because it was felt that the required expenditure of time and effort in screening would not have been justified by the quality of data obtained. The major objectives, to delineate the village pattern and acquire a large artifact sample, made it necessary to strip away as much of the plow zone as possible in the allotted time, in order to expose features and post molds.

In every season a search was made of ridges, spurs, and knolls in the vicinity of the site in the hope of locating the cemetery or cemeteries that must be associated. Our efforts were completely unrewarded, which is not surprising because Mohawk cemeteries of this period are so far unknown.

LONGHOUSES

It was difficult to trace the patterns of some longhouses. Although the yellow sand subsoil provided an excellent background for observing even faint post molds, the wall lines of some houses were surprisingly vague or confused by extraneous molds and intersecting features. Furthermore, because the landowner had requested that most of the pine trees that covered the hilltop be left intact, we were able to completely expose only one house, House 1. The outlines of several houses are provisionally reconstructed in Figure 43. Houses 2 through 7 were partly delineated by means of a system of long trenches cleared by the front-end loader.

The solid lines in Figure 43 represent lines of post molds mapped in detail, except for the north ends of Houses 2, 3, and 7 and parts of Houses 4 and 5, which were mapped by the use of the plane table and alidade. Dashed lines represent hypothetical or unexcavated house walls.

The original report suggested that there was good evidence for nine houses, arranged in three groups of three houses each, fitted neatly within the shape of the 2.5-acre hilltop. Just east of the stockade, in northwest to southeast order, were Houses 9, 1, and 8, each at a small acute angle to the other. The long axes of these houses paralleled the edges of the hill. There were scattered post molds as well as lines of molds not assignable to any of these houses in the space between Houses 1 and 8 and the stockade. Other molds and features in short lines or groups occurred in the broad "streets" or alleys between houses, and between House 9 and the steep bank on the north. These may represent communal areas for food preparation, storage, and other purposes.

Houses 7, 2, and 3, in order from southwest to northeast, were roughly perpendicular to Houses 9, 1, and 8 and situated on the broadest part of the hill. Their long axes were oriented northwest-southeast. These structures were almost precisely parallel to each other and separated by narrow alleys from 5 to 8 feet wide. These alleys were not readily defined in some middle portions, due in part to a profusion of extra post molds and pits. This problem is also a consequence of the landowner's request that large, key areas remain unexcavated. But in most places the houses and alleys were clear-cut, thus lending support to the reconstructions. The northeast wall of House 3 grazed the edge of a large hollow on the north side of the hill. Considerable refuse once covered the slopes of the hollow, but this midden has suffered badly at the hands of collectors.

On the broad, roughly trapezoidal east end of the hilltop, Houses 4, 5, and 6 in north to south order were arranged much like Houses 9, 1, and 8. Their long axes were oriented roughly east-west. Houses 4 and 5 were parallel. At its west end House 4 dipped slightly into the large hollow, reaching within a few feet of House 3. House 6 was oriented at an acute angle to House 5. Although its east end was not exposed, it almost certainly fell short of an actual intersection with the south wall of House 5. The "streets" between Houses 4 and 5, and Houses 5 and 6, contained few molds and pits. Between Houses 4 and 5 and the east end of the hill were a very few stray pits and post molds.

Ritchie and Funk (1973:321) noted that there may have been room for a small structure in the unexcavated area north of House 4 and east of the hollow. Unfortunately no excavation units were placed in this area. Ritchie and Funk also noted that post molds and pits overlapping with the stockade might represent another house (as it turns out, probably 2 houses).

Funk's reanalysis in 1999 suggests some revisions of the original interpretations of the number, size, and placement of houses (cf. Figure 43 with Ritchie and Funk 1973:Figure 30). It appears likely that two, not one, houses overlapped the stockade—the east end of House 12 suggested by molds mapped just east of the inner stockade line, the east end of House 13 by molds between the stockade lines. These partly uncovered houses were parallel to each other and separated by an alley about 5 feet wide. The intrusions of some stockade molds into pits associated with these houses strongly indicates that the houses predated the stockade. A rather amorphous group of molds and features located between House 9 and the drop-off is very tentatively suggested to represent another house, only a small portion of which was excavated. If real, the house would have had a tilted floor because of the increasing slope toward the north. A reassessment of the numerous molds and pits originally assigned to House 8, including the molds and pits lying immediately west of House 2, indicates that a small house, 11, lay in the area between Houses 8 and 2. House 8 may therefore have been shorter than proposed in 1973. But the uncertainty caused by the large block left unexcavated in this vicinity compels us only provisionally to offer the new interpretation of Houses 8 and 11. It remains possible that House 7 extended as far south as the assumed east end of House 11. It also seems clear that another structure, House 10, occupied the area between House 6 and the south edge of the hill.

The following description of houses largely reflects the previously published description of Houses 1 through 9 (Ritchie and Funk 1973:317–321) but adds the data for the newly identified houses and the revised length of House 8.

House 1. About 154 feet long and 19 to 20 feet wide (Figures 44–46). The total area of this house was about 3,160 square feet, and nearly 100 percent of it was exposed. The east end was definitely rounded. The west end was not clearly defined, but it was probably rounded. There is some uncertainty about the exact position of the west end, partly because of a small, unexcavated area adjacent to the molds believed to form the end, partly because of some features situated between the house and stockade, and partly because there was a rather diffuse linear group of molds that could represent an extension of the south wall. However, there is no matching north wall, and the group of molds is believed to be part of the north wall of House 8. No door gaps were evident at either end. The north and south walls and east end contained unusually numerous molds, indicating at least one or two episodes of rebuilding. The wall lines, as in the case of all the other houses, were composed of post molds averaging 3 to 4 inches in diameter; the range in depth for all houses was 4 to 26 inches. In cross-section most of the molds were straight sided, with rounded, blunt ends. Internal structuring was difficult to make out in the proliferation of post molds, but roughly linear arrangements of large molds about 6 feet from the walls appeared to represent support posts along bed lines. These molds, 6 to 10 inches in diameter, ranged from 15 to 28 inches deep, with straight sides and rounded ends (bases). It should be stated, however, that these lines were not continuous over long distances within any of the houses at Garoga and in fact were often observed at sporadic intervals, though generally located within a uniform distance from the side walls. Interior partitions, characteristic of some Iroquoian houses seen by European observers in the seventeenth century, could not be defined given the plethora of post molds inside the house. This was also usually the case with the other houses.

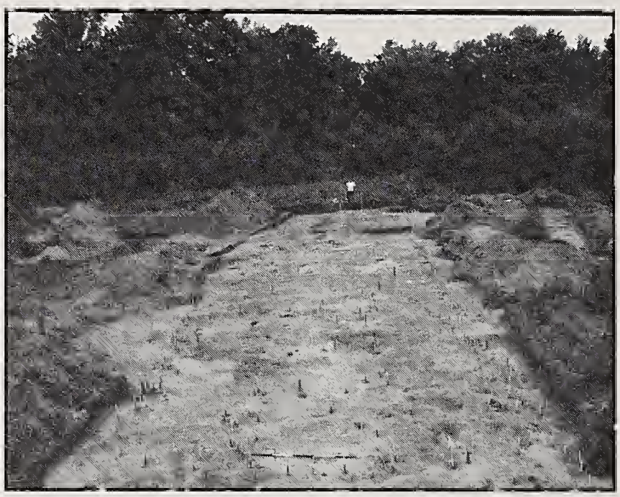

Figure 44. Photograph of completely exposed House 1, Garoga site. Looking northeast.

Concentrated along the long axis of the house were hearths, occurring either as burned patches of sand or as basin-shaped pits filled with charcoal-stained earth and fire-cracked stones and rimmed by fire-reddened sand. Some hearths, however, were considerably off center or grouped close together. Therefore of the 21 hearths within the house walls, it is believed that only 14 or so could have been in use at any given time. Perhaps 3 or 4 hearths located on or near bed lines could not have contained fires while the house stood there. Some burned sand patches on top of pits were probably hearth sweepings rather than the locations of actual fires.

Storage pits, generally large and of cylindrical form, tended to occur in rows between walls and bed lines, but a few pits were located on the central aisle.

House 2. About 212 feet long and 20 feet wide. The total floor area was about 4,350 square feet. Roughly 1,750 square feet (40 percent of the total) were excavated. The south end was squarish, with rounded corners (Figure 47). The north end appears to have been similar in form. No door gaps were seen. The bed lines, marked by large support posts,

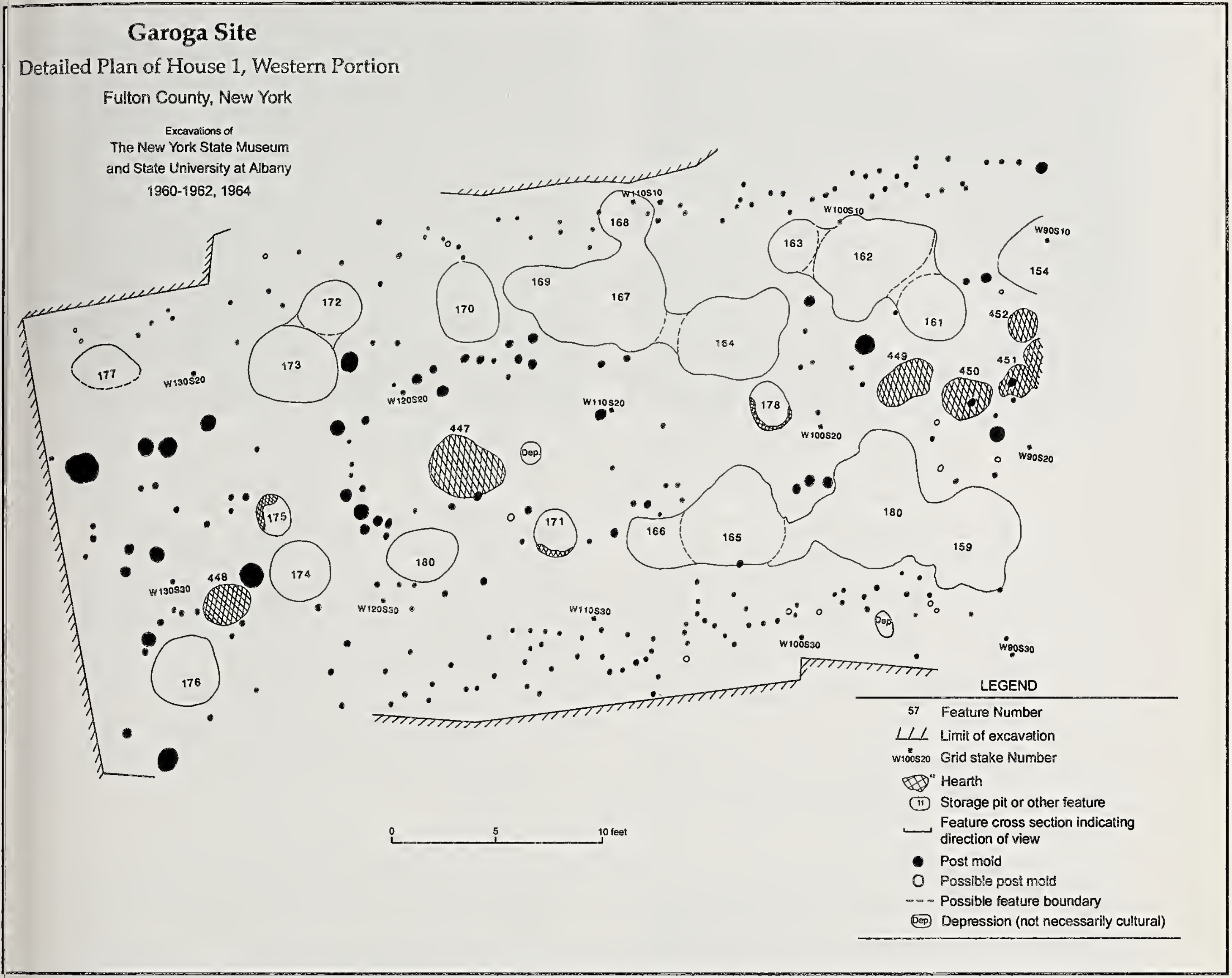
Garoga Site
Detailed Plan of House 1, Western Portion
Fulton County, New York
Excavations of
The New York State Museum
and State University at Albany
1960-1962, 1964
W110S10
W100S10
W90S10
W130S20
W120S20
W110S20
W100S20
W90S20
W130S30
W120S30
W110S30
W100S30
W90S30
154
159
161
162
163
164
165
166
167
168
169
170
171
172
173
174
175
176
177
178
180
447
448
449
450
451
452
Dep.
0
5
10 feet
LEGEND
57 Feature Number
Limit of excavation
W100S20 Grid stake Number
Hearth
Storage pit or other feature
Feature cross section indicating direction of view
Post mold
Possible post mold
Possible feature boundary
Depression (not necessarily cultural)

Figure 45. Detailed map of western portion of House 1, Garoga site.

were spaced about 6 feet from the side walls. Most of the pits were aligned, once again, between walls and bed lines, but a few were centrally positioned. There was a central row of fireplaces.

In the course of mapping part of this house with plane table and alidade, it became evident that there was a bend along the long axis. The total deviation from a straight line amounted to about 5 feet. This unusual attribute was also true of Houses 3 and 7. Because we were unable to expose more than about 40 percent of any of these houses, some doubt may be thrown upon the inferred patterns in Figure 43. Yet there were no indications that these three houses were actually shorter and in each case paired end-to-end with another house, or that other patterns intersected those of Houses 2, 3, and 7.

House 3. About 225 feet in length, 20 feet in breadth. Total area 4,450 square feet. Approximately 810 square feet (18 percent) of this house were excavated. As was the case with House 2, the ends were fairly straight, with rounded corners. Door gaps were not apparent. The bed lines could be partially delineated with some confidence. Pits were found along the walls, but, as usual, some were on the midline. One midline hearth was unearthed.

House 4. About 187 feet long and 20 feet wide (Figure 48). Total area estimated at 3,740 square feet. Some 1,775 square feet (48 percent of the total) were

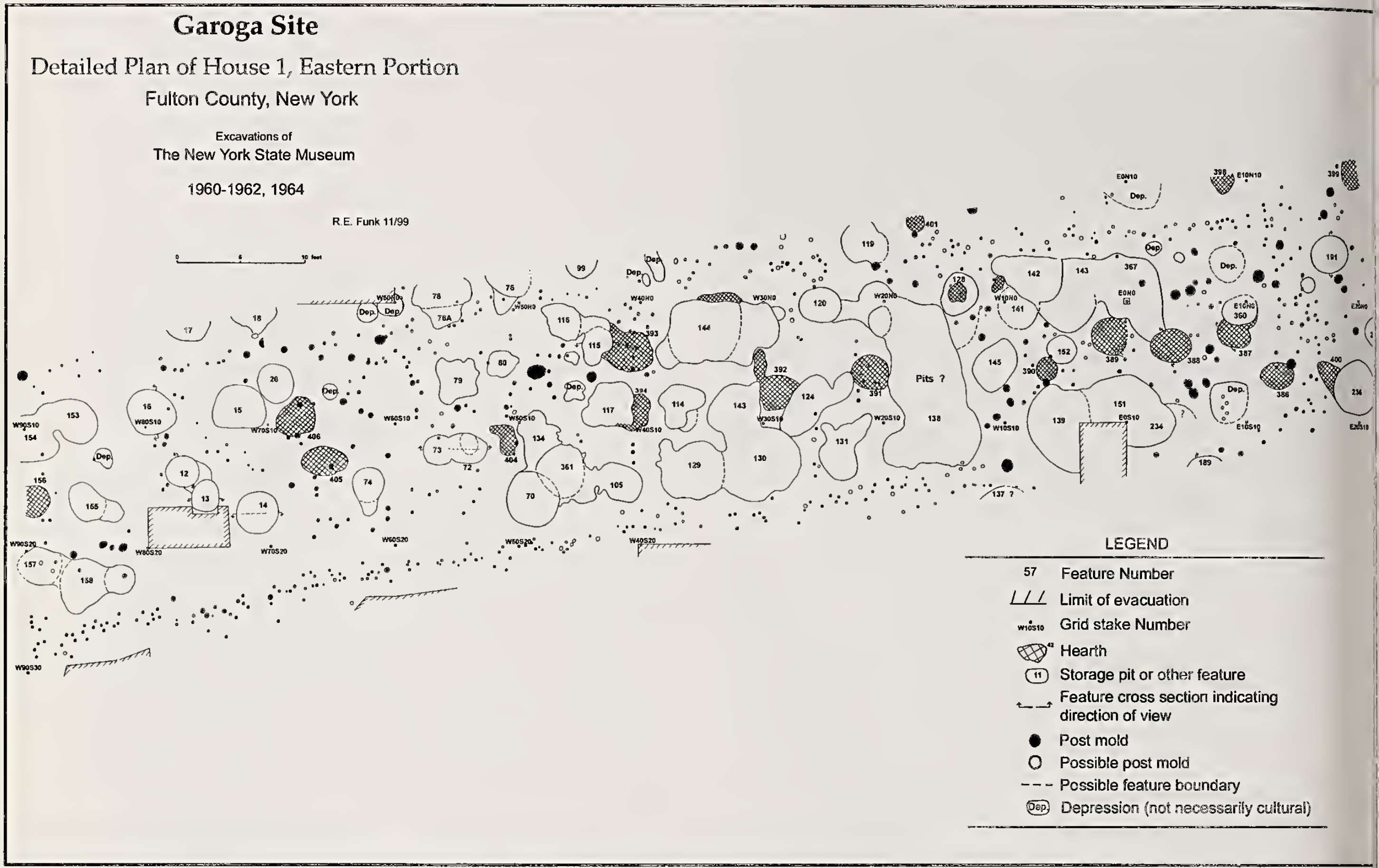
Garoga Site
Detailed Plan of House 1, Eastern Portion
Fulton County, New York
Excavations of
The New York State Museum
1960-1962, 1964
R.E. Funk 11/99
Pits ?
LEGEND
57 Feature Number
Limit of evacuation
Grid stake Number
Hearth
Storage pit or other feature
Feature cross section indicating direction of view
Post mold
Possible post mold
Possible feature boundary
Depression (not necessarily cultural)

Figure 46. Detailed map of eastern portion of House 1, Garoga site.

excavated. The ends were rounded without obvious door gaps. Bed lines were partially definable, as was a central row of hearths (2 examples unearthed). Most pits were arrayed along the walls, two along the midline.

House 5. About 175 feet long (not 187 ft, as stated in the 1973 report), 20 feet wide. The enclosed area was 3,500 square feet, and 1,800 square feet (51 percent) were exposed. The ends were rounded. Only the western half of the structure was entirely exposed (Figures 43, 48). In the west end was an entranceway about 6 feet wide. Just outside the entrance was a line of molds perhaps signifying a baffle or screen, emplaced as protection from winter winds. In the interior, a curved line of molds 15 feet from the end probably denotes an earlier stage of construction. The added portion was free of hearths and pits; the only feature was a shallow depression containing vegetal food remains. The addition may have served as a storage shed for bark barrels full of corn.

Hearths were located on the midline (7 examples unearthed) and offline (3 examples). The offline hearths could not have contained active fires during the life of the house and may either have preceded it or followed its collapse. Near the center of the house was a unique hearth complex. An amorphous depression about 8 feet across and filled with brown sand merged on its periphery with several pits. It was about 15 inches in maximum depth. At its base was an oval patch of burned sand and charcoal. Near this buried hearth was a probable cooking pit 3 feet in diameter and 15 inches deep below plow line, filled with burned cobbles. In, around, and partly under the cobbles was brown, charcoal-flecked sand. The cobbles rested in a thin lens of charcoal, which was in turn underlain by fire-reddened earth and brown sand.

Bed lines were not readily demarcated within the house. Interior molds occurred in confusing numbers. Storage pits tended to be aligned between bed lines and walls, but at least two were located on the midline.

House 6. Only a small portion of this house was unearthed. Pits, hearths, and post-mold lines

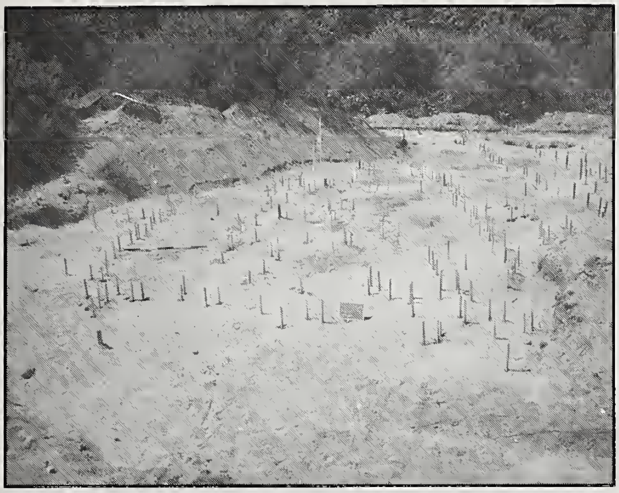

Figure 47. Photograph of partially exposed House 2, Garoga site. Looking northwest.

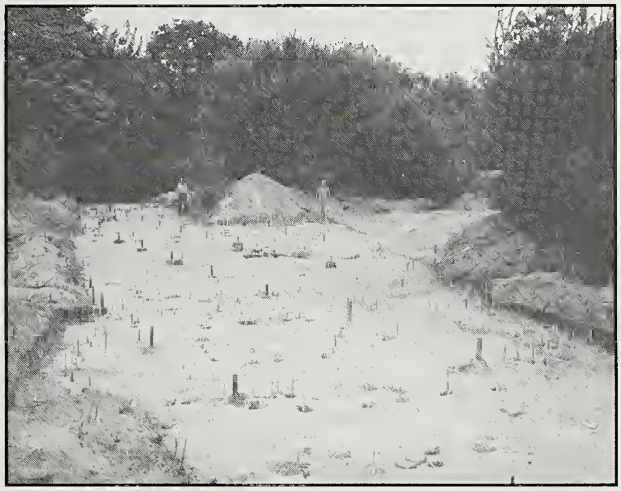

Figure 48. Photograph of partially exposed Houses 4 and 5, Garoga site. Looking east.

assumed linear patterns suggestive of the same basic arrangements as in the other houses. The house is estimated to have been about 100 feet long, even though the east end was not exposed. The estimate is probably reliable because the house would have impacted the south wall of House 5 if extended farther than shown on the map, Figure 43. The width was about 20 feet. The partially exposed west end was, provisionally, rounded. The total enclosed area was around 2,000 square feet. Some 880 square feet (44 percent) were dug.

House 7. The revised estimate of length is about 125 feet. The breadth was 20 feet. The area was approximately 2,500 square feet, 1,000 square feet (40 percent) of which was excavated. The poorly defined ends may have been rounded. Internal patterning was the same as in the other houses. As in the case of Houses 2 and 3, the walls seem to have been curved. On Figure 43 a possible length up to about 225 feet is shown, in view of the ambiguities created by the reinterpretation of House 8, the provisional addition of House 11, and the large unexcavated area between the suspected east end of House 8 and the suggested south end of House 7.

House 8. Very tentatively, estimated to have measured 175 feet long and 20 feet wide. Hearths, pits, and post molds were abundant but did not occur in narrowly defined lines, giving the impression of rather amorphous form, a problem exacerbated by the incomplete excavation. Many of the features and molds in this area of the site were probably extraneous to the house. Little can be said about internal patterning. The east end appears to have been rounded.

House 9. Approximately 212 feet long and 20 feet wide. Area 4,250 square feet, 1,400 square feet (33 percent) of which was exposed. Rounded at the west end, but no apparent door gap. Midline hearths were present (at least 6 mapped), as were pits along former bed lines (1 or 2 pits were located on the midline). Most of the wall lines in the excavated eastern portion were either missing or merely suggested by sporadic post molds. Many molds have probably vanished through the combined action of plowing and soil creep due to the location of the house on the sloping north side of the hilltop. This fact and the dense cluster of features located where the middle section of the house would be expected make it impossible to be sure which features were associated with the house and which ones lay outside it. Therefore the eastern portions of the house are only vaguely apparent, but the proposed location of the east end is reasonable despite the lack of obvious mold patterns because the house had to stop short of the west wall of House 7.

House 10. Length unknown, width around 19 to 20 feet. Excavated area 400 square feet. Pits, hearths, and post molds abundant within the exposed portions. The ends were not uncovered, hence their shape is unknown.

House 11. Length is estimated at 87.5 feet, width at about 20 feet. The area was about 1,750 square feet. Some 1,300 square feet (74 percent) were excavated. Pits and hearths seem to have been numerous, with hearths arranged along the midline. The limited evidence suggests the ends were rounded. No door gaps were evident.

House 12. Length unknown, width around 19 to 20 feet. Roughly 620 square feet were excavated. The east end was apparently straight with rounded corners.

House 13. Length unknown, width around 19 to 20 feet. Approximately 500 square feet were excavated. The shape of the east end was indeterminate.

It remains possible, even probable, that other houses existed on the hilltop outside the New York State Museum explorations. The precise location of the storage pits excavated by Harrington (1905) in relation to the State Museum's grid system is unknown, but many of them were almost certainly associated with houses. Although he made a systematic map of the hilltop showing the excavated areas, his reference stakes no longer exist. Some of his work was within the village area defined in the State Museum excavations. It is possible that some of the features previously excavated by Harrington were encountered in those explorations, but they remain unidentified because they were not excavated by Funk and his crew.

Harrington located and excavated 13 pits between the stockade and a fence 150 feet west of the stockade. He did not explore beyond the fence, but it seems certain that additional features, and probably houses, were present both east and west of the fence. In his report Harrington does not mention or describe post molds of any kind, though some must have existed in the areas he excavated.

The possibility remains that another house existed in the area of the hilltop north of House 4. Because of the limited space, the house would have had to be rather short. But Harrington's trench near the northern edge did not locate additional features that might have provided evidence for such a house.

PALISADE

The defensive walls for the village were located at the narrowest part of the ridge, near its southwest end. There were two such walls, each about 100 feet long and consisting of a row of large posts set firmly into the ground. The lines, about 6 feet apart at each end and 15 feet apart at the middle, were bow shaped, curving at the ends toward the main village area. The inner wall was nearly straight except at the ends. The outer wall more nearly described an arc (Figures 43, 49, 50).

There were 36 recognizable molds on the inner line, ranging from 9 to 27 inches in diameter. The 33 molds observed in the outer line ranged from 6 to 27 inches across (the largest mold was obscured by an intersecting pit feature). Near its north end, there was an apparent gap of 11 feet in this line. The gap was partly occupied by a shallow refuse-filled depression 3 feet in diameter. The expected post molds were missing, however.

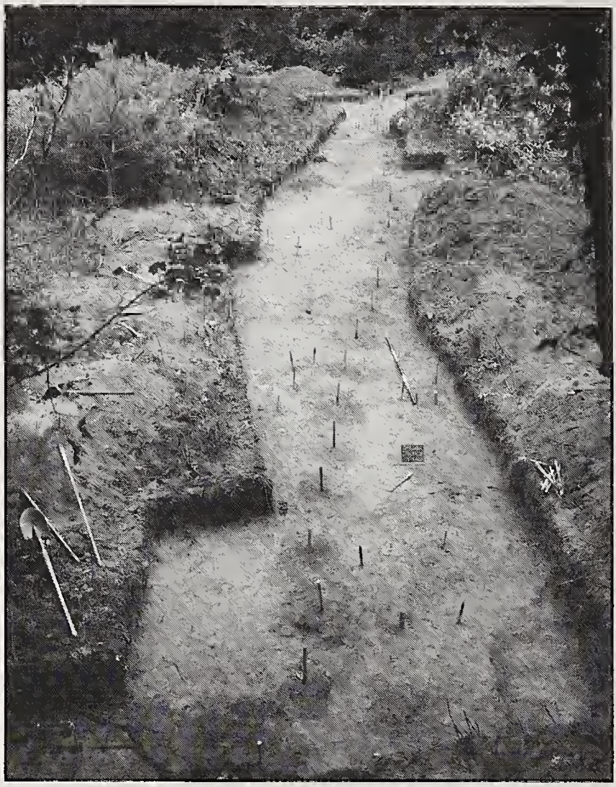

Figure 49. Photograph of stockade Line 1, Garoga site. Looking southeast.

The hiatus seems excessively wide for an entranceway. No comparable space existed on the inner line. But toward the ends of both lines the molds were progressively shallower. The last molds in the lines were no more than 2 or 3 inches deep. This shallowness appears to correlate with the increasing slope of the hilltop toward its steep banks. Through decades of cultivation, it seems likely that soil loosened by the plow moved slowly downslope via erosion and soil creep. Each successive plowing on the slopes would have bitten a little deeper into the sandy subsoil, truncating the tops of pits and post molds. In this way part of the outer stockade could have been obliterated. On the relatively flat crest of the hill, where little or no soil movement would have occurred, the palisade post molds extended as much as 36 inches below the surface.

This hypothesis is supported by the remaining traces of House 9, located on the sloping northern edge of the site. The floor plan was indicated by a

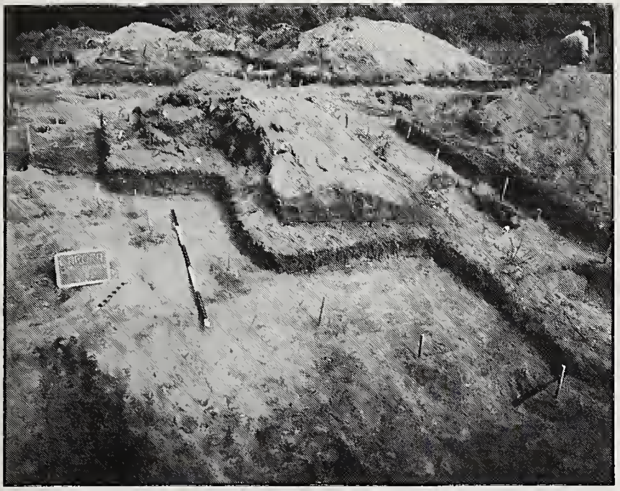

Figure 50. Photograph of stockade Line 2, Garoga site. Looking northwest.

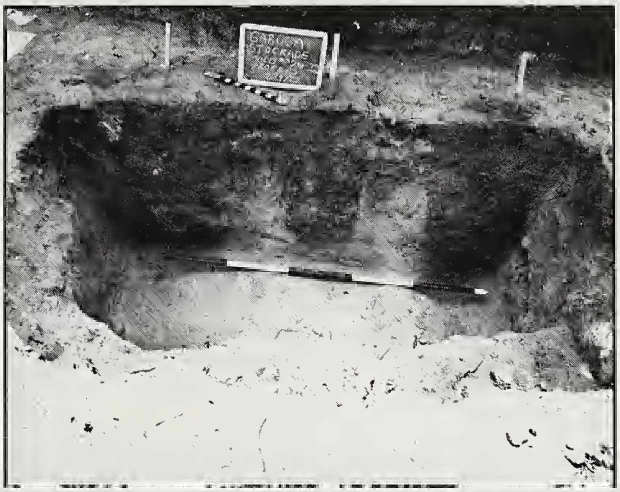

Figure 51. Photograph of cross-sectioned stockade post molds, Garoga site.

poorly defined south wall and by correlated lines of storage pits. But the north wall was almost entirely absent, probably as a result of the process outlined above.

It seems intuitively likely that raiding parties could easily have entered the village by skirting the ends of the palisades along the edge of the dropoff. But it is by no means certain that some molds have not disappeared at the ends. Adding just 10 feet to each end would have required attackers to go down, then up, rather steep upper portions of the hillsides, making them vulnerable to defenders. It is possible that auxiliary palisade lines once existed along the edges of the hilltop, the post molds long since destroyed by plowing and soil creep.

At the north end of the inner palisade, possible auxiliary molds about 3 inches in diameter were noted. They were arranged in a rough semicircle around the last two molds and may have supported a platform for observation or battle. No such pattern occurred elsewhere on the defenses.

Small molds about 3 inches in diameter were scattered along and between the palisade lines, but lines of probable house walls were evident, running east-west across the stockade. Two of these lines were about 20 feet apart. Larger molds, presumably support posts, ran parallel to the lines of smaller molds. Considering the fairly numerous storage pits and hearths in this part of the site, these lines must represent at least two longhouses, Houses 12 and 13, overlapping the stockade and occupied before its erection. This sequence is suggested, because in five cases, pits and palisade molds intersected; in nearly every case, the molds were clearly intrusive into the pits.

In cross-section the palisade molds varied from conical to blunt ended (U-shaped) (Figures 51, 52). It was obvious from their size and shape that, at least in the case of the larger molds, they had intentionally been scooped out in the yellow sand to receive the butts of large posts up to 2 feet in diameter. The actual length (height) of these posts is a matter of conjecture.

Their fill was largely brown sand, but there was a great deal of variation in shading from tan to gray to black, depending on organic staining. In some molds burned sand and charcoal were found. Others contained small amounts of refuse, including potsherds. It appears that after the posts were removed or rotted away, they became filled with patches of ground midden, humus, and subsoil.

In two examples, the soft, much rotted, and uncharred wooden butts of the original posts still remained in the ground. The outer shell of one butt was preserved and measured 14 inches in diameter, tapering to 9 inches at the base. These posts were probably of either white or red cedar, which tends to resist decay longer than most other kinds of wood.

Few possible door gaps were noted in either line, apart from the large hiatus previously mentioned. The spacing between molds ranged from 6 to 33 inches. Near the south end of the outer line was a space of 27 inches; at the same part of the inner line was a gap of 33 inches. Each line also featured a few gaps of 18 inches. People could easily have passed through any of these. It is assumed that, except at entranceways, the large posts were interwoven with innumerable withes and saplings, and perhaps covered by sheets of bark, to create a solid wall.

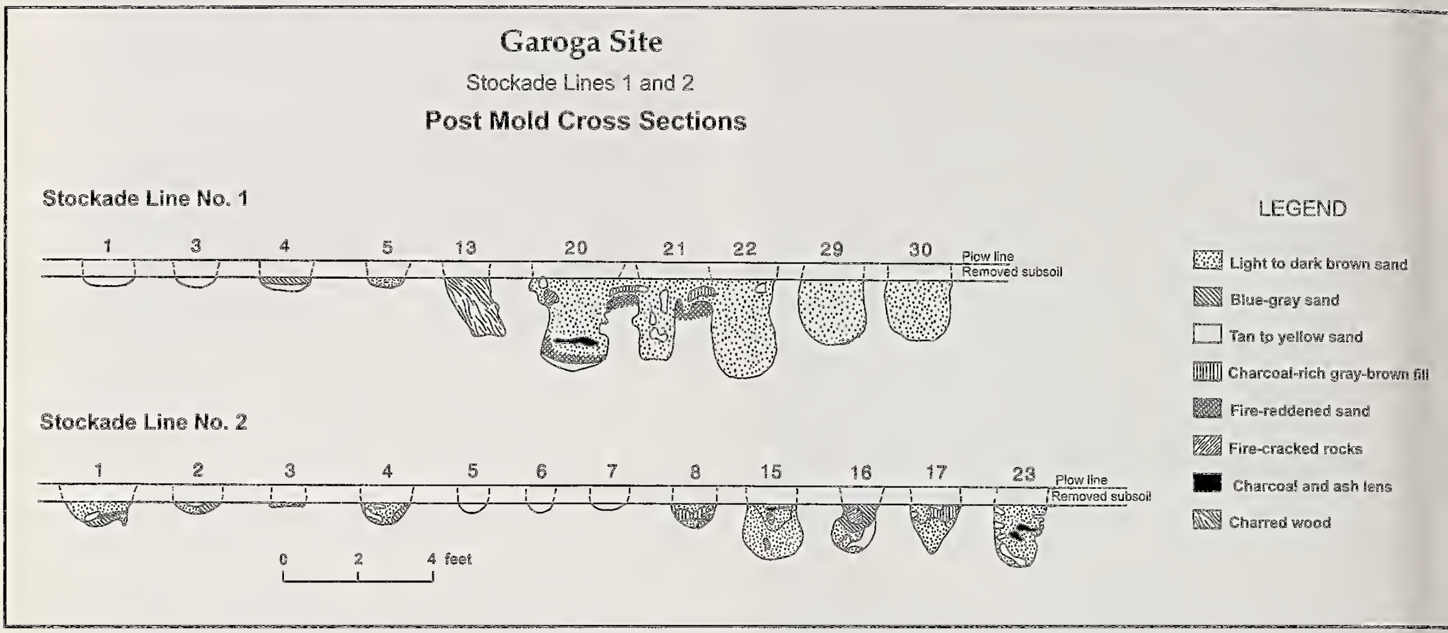
Garoga Site
Stockade Lines 1 and 2
Post Mold Cross Sections
Stockade Line No. 1
1 3 4 5 13 20 21 22 29 30
Plow line
Removed subsoil
Stockade Line No. 2
1 2 3 4 5 6 7 8 15 16 17 23
Plow line
Removed subsoil
0 2 4 feet
LEGEND
Light to dark brown sand
Blue-gray sand
Tan to yellow sand
Charcoal-rich gray-brown fill
Fire-reddened sand
Fire-cracked rocks
Charcoal and ash lens
Charred wood

Figure 52. Graphic showing drawn profiles of stockade post molds, Garoga site.

POST MOLDS: ATTRIBUTES AND DESCRIPTIVE STATISTICS

Numerous post molds within houses, chiefly along the identified walls, were cross-sectioned and measured for diameter and depth. All measurements are in inches. The data are presented in Tables 25 and 26. No cumulative statistics were available for the palisade post molds.

There has been much discussion and debate about longhouse architecture (e.g., Kapches 1993; Snow 1997; Wright 1995), because the construction of these buildings can only be conjectured from the archaeological evidence of post molds and the documentary descriptions of early European observers. Attempts at longhouse reconstructions consistently fail to create structures that match the archaeological and documentary evidence (Snow 1997:75–81), leaving many to wonder how the Iroquois actually erected these buildings. The post-mold data from the Klock, Smith-Pagerie, and Garoga sites can provide some additional particulars.

It is interesting to note that, with a single exception, the average diameter of interior bed-line post molds is greater than exterior wall post molds at the Klock, Smith-Pagerie, and Garoga sites. Mean post-mold diameters for bed lines range from 5.3 to 7.9 inches, whereas mean post-mold diameters for exterior walls range from 2.9 to 5.1 inches for the three sites. (The single exception is House 13 at the Garoga site with a mean exterior wall diameter of 8.6, but because this house overlaps the large post molds of the village palisade, perhaps it should be discounted. There may have been some confusion accurately assigning post molds to the two structures.) In addition, the average depth of interior post molds is also usually greater than the average depth of exterior wall post molds. Mean post-mold depths for bed lines range from 6.5 to 12.3 inches, whereas mean post-mold depths for exterior walls range from 5.2 to 10.6 inches for the three sites.

We infer from these size and depth differentials that many of the interior posts were weight-bearing members of the longhouse superstructure, rather than simply posts used to support the interior bed platforms or sleeping compartments. This is consistent with most interpretations of Iroquoian architecture, particularly Wright's (1995:10–13) *pi*-frame construction technique. It is also consistent with basic wood-building principles that cut across cultural lines, namely that the most important structural supports should be protected from the elements to preserve the long-term integrity of the structure. The Iroquois do not appear to have developed any specialized techniques to protect exterior wall posts from wet-rot at ground level other than the use of simple bark sheathing. Using interior support posts as the principal load-bearing elements was a simple and workable solution to the structural threat of wet-rot in the climatic conditions of the Northeast.

In this regard, the convention of referring to interior post molds as bed lines or partitions is an unfortunate one, as these terms suggest tertiary structural elements. In fact, many of these interior posts may have been primary or secondary load-bearing supports. We also take exception to Snow's (1997:82) statement that most of the interior posts were smaller than the exterior wall posts in Mohawk longhouses. This is not true of the Klock, Smith-Pagerie, and Garoga sites, where the interior post molds tend to be slightly larger than the exterior ones. Some of these factors may vary among the Mohawk based upon site-specific soil characteristics. The possibility of change over time in Mohawk building practices is also worthy of additional study.

Table 25. Garoga Site Post-Mold Statistics for Houses 1 through 4, Diameters (Top) and Depths (Bottom)

DIAMETERS	House 1				House 2			House 3	House 4	
	N	S	E	B	E	S	B	E&W	E	S
Mean	3.8	2.9	3.9	6.7	3.5	3.8	6.9	3.6	5.1	3.3
Mode	3	3	3	6.5	3	3	6.5	3	5	3
Median	3	3	3	7	3	3	6	3	3	3
Standard deviation	1.9	0.85	2.2	3	1.2	1.2	2	1.6	2.4	1.1
Range	9	3.5	10.5	9	4.5	3.5	8	8.5	6.5	4
Minimum	2	1.5	2	3	2.5	2.5	4	1.5	2.5	2
Maximum	11	5	12.5	12	7	6	12	10	9	6
N	45	19	76	6	28	9	20	39	9	23

DEPTHS	House 1				House 2			House 3	House 4	
	N	S	E	B	E	S	B	E&W	E	S
Mean	10.6	6.3	9.9	12.3	7.7	9.4	7.4	6.8	7.4	7.7
Mode	10	6	9	13	7	10	6.5	6	6	8
Median	6	8	14	13	5	10	5	7	6	8
Standard deviation	6.2	3	4.8	5	2.9	2.5	3.4	3.5	3.1	2.6
Range	25	11	18	15	13	7	14	16	9	9
Minimum	3	1	3	3	4	5	2	2	4	4
Maximum	28	12	21	18	17	12	16	18	13	13
N	45	19	76	6	28	9	20	43	9	23

Note: House 1, N = north wall; S = south wall; E = east end wall; B = bed lines. House 2, E = east wall; S = south end wall; B = bed lines. House 3, E&W = east and west walls combined. House 4, E = east end wall; S = south wall. All measurements in inches.

Table 26. Garoga Site Post-Mold Statistics for Houses 5, 6, 9, 11, and 13, Diameters (Top) and Depths (Bottom)

DIAMETERS	House 5		House 6		House 9			House 11		House 13
	N	W	N&S	B	W	N	S	N	B	N
Mean	2.9	3.7	3.4	6.8	4.7	3.4	3.9	3.9	5.3	8.6
Mode	3	3.3	3	7	4	3	4	3	5	9
Median	3	3	3	10	4	3	3	3	5	4
Standard deviation	0.7	1.1	1.6	2.4	1.4	0.7	4	1.9	1.7	4
Range	2	4	12	7	6	2	7	9	5	14
Minimum	2	2.5	2	3	3	3	2	2	3	4
Maximum	4	6.5	14	10	9	5	9	11	8	18
N	15	12	62	9	24	9	58	27	15	21

DEPTHS	House 5		House 6	House 9	House 11
	N	W	B	S	N
Mean	7	8.8	12.3	8.3	5.4
Mode	5.5	7.5	12	7	4
Median	12	6	12	6	4
Standard deviation	3.2	4	5	4	3.7
Range	9	14	15	14	13
Minimum	3	4	4	2	2
Maximum	12	18	19	16	15
N	15	12	8	22	13

Note: House 5, N = north wall; W = former west end wall or partition. House 6, N&S = north and south walls combined; B = bed lines. House 9, W = west end wall; N = north wall; S = south wall. House 11, N = north wall; B = bed line. House 13, N = north wall. All measurements in inches.

FEATURES OTHER THAN POST MOLDS

Features other than post molds primarily consisted of two functional types: storage pits and hearths. Hearths were usually located within houses, along midlines, but, as noted above, some occurred on bed lines or intersected house walls and could not have burned during the lifetime of the houses. A moderate number of hearths occurred outside houses, in alleys or in open, communal, activity areas. Hearths generally consisted of shallow, oval or nebulous patches of fire-reddened sand, evidently all that remained of intact features, probably shallow basins, long since obliterated by cultivation. A number of hearths were deeper than usual, so that the lower portions survived as basins of varying depth below plow line, surrounded by burned sand. These depressions contained charcoal, ashes, fire-cracked stones, and reddened soil, sometimes displaying complex lensing (Figure 58). In total 89 features (82 storage pits, 2 pits or hearths, 5 hearths) were excavated during the four seasons of work.

Pits outnumbered hearths by a ratio of 4.3 to 1. They constituted over 80 percent of all features on the site, hearths nearly 19 percent, and the category "pits or hearths" only 0.6 percent. Pits were generally larger and deeper than hearths, usually cylindrical or conoidal in form. Where first uncovered just below the plow zone, most pits appeared as oval to circular stains, dark brown to black against the yellowish-brown sand subsoil (Figures 44, 47, 48). At least 80 percent of the recorded number occurred within houses. They ranged in depth from 18 to 96 inches. The oral diameter ranged from 30 inches to 10 feet. The actual extremes in variation of individual pits was from a diameter of 30 inches and a depth of 18 inches, to a diameter of 6 feet and a depth of 8 feet, and a diameter of 10 feet with a depth of 82 inches. The standard pit at Garoga was cylindrical in form, with a flat or rounded base. The oral diameter fell mainly between 36 and 54 inches, the depth between 40 and 64 inches. By and large, there was a gentle taper toward the base, although a significant minority was essentially straight sided. A small number belled out slightly in lower portions. A few examples were conoidal or U-shaped in cross-section.

The basic form of storage pits is evident from the cross-sections photographed in Figures 54 through 57 and drawn in Figure 58. While in use the pits were of course hollow receptacles, into which vegetal foods were put or from which they were removed for consumption. They became filled with sand, refuse, or other material only at the close of their effective life as storage bins (Ritchie 1980:318). Ritchie and others have suggested that this took place after the pits had become infested with mold, mice, insects, or other vermin, or had partly collapsed through shifting of the surrounding sand subsoil. These features would then continue for a while in useful service as convenient places for waste disposal.

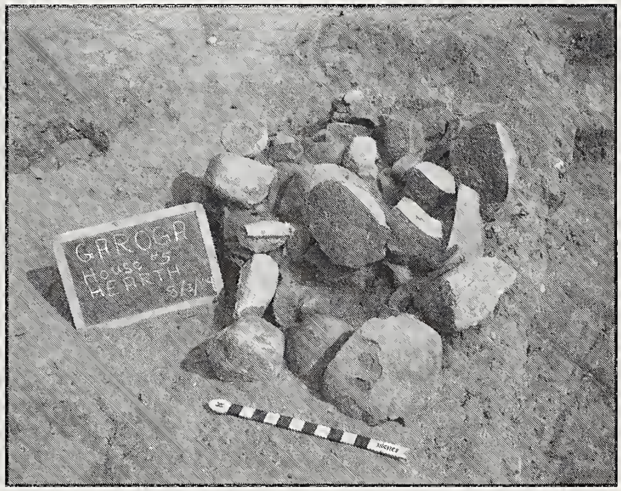

Figure 53. Photograph of cross-sectioned hearth in House 5, Garoga site.

The nature of the fill varied considerably. In some instances it was a completely homogeneous brown sand. One pit contained sand so light in color it could barely be distinguished from subsoil. Most pits displayed a certain degree of lensing often equatable to stratification (Figures 52–56). Commonly, the layers or lenses were sterile yellow sand, frequently appearing to be the result of slumping from the sides of the pit. In other cases, the sterile lenses rested on dark, refuse-laden lenses, indicating that sand had been deliberately thrown in to cover odorous masses

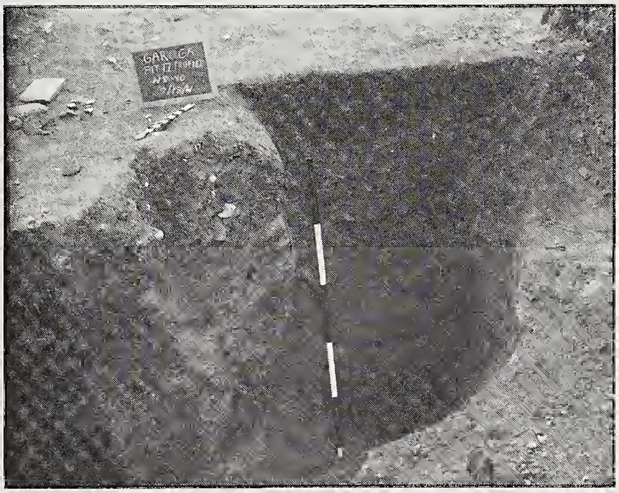

Figure 54. Photograph of cross-sectioned storage pit, Feature 17, Garoga site.

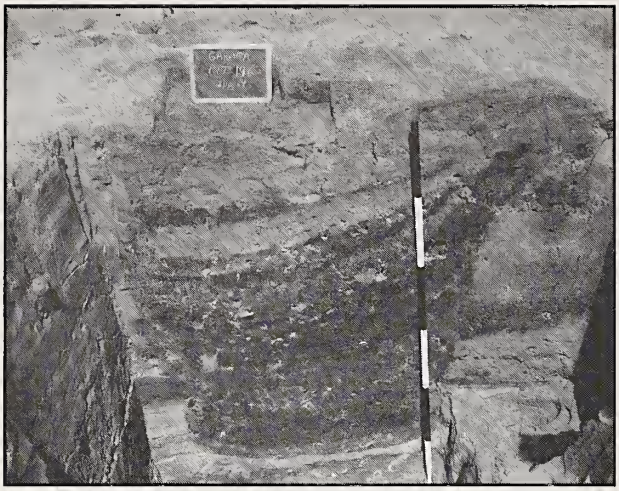

Figure 55. Photograph of cross-sectioned storage pit, Feature 96, Garoga site.

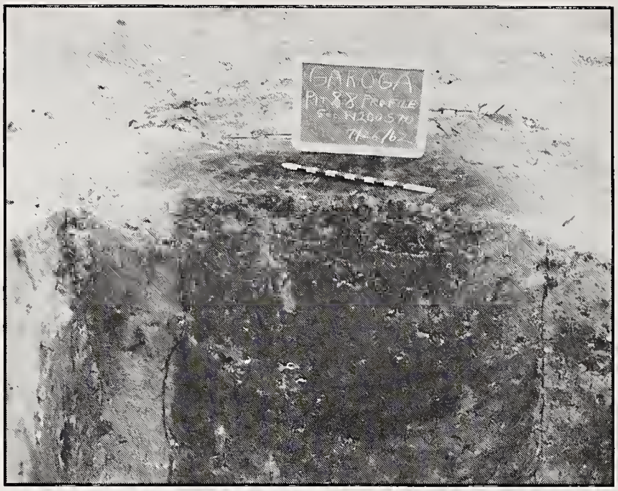

Figure 56. Photograph of cross-sectioned storage pit, Feature 88, Garoga site.

of rotting garbage or offal. Some layers, filled with charcoal, fire-cracked stones, ashes, animal bones, and burned sand were evidently hearth sweepings.

Ordinarily, the observed differences in lenses, patches, or strata were recognized simply by color contrasts, frequently rather faint, in the sand that constituted the main ingredient in pit fill. These colors ranged from white through yellow, light brown, dark brown, gray-brown, to black. The actual color depended largely on included amounts of charcoal, ashes, decayed organic matter, subsoil, and probably humus from the original prehistoric topsoil. In some pits there were entire lenses of burned sand; in others there was evidence that fires had been built on top of them. A few pits were beautifully and complexly stratified in cross-section, displaying many colors.

A frequently recurring item was a lens of black, fibrous material, located at or near the top of the pit. This lens was invariably surmounted by another lens of sterile sand or humus. The black fibrous lens appears to represent thoroughly decayed forest mold, which accumulated in the top portion of the abandoned pit as its contents settled. The vast majority of lenses or layers sloped in toward the center of the pits, as a result of such settling.

During the excavation of many pits, a thin dark stain was observed on their peripheries between fill and subsoil. This stain was thicker and more prominent at their bases. In some instances, charred bark or grass was preserved along the bottom. A layer of grass definitely overlay bark in one pit. This bark and grass usually left only a stain when it rotted away but was preserved in rare instances when accidentally set on fire. It would have served to keep the pit contents (probably corn, beans, and squash) dry, free of sand, and would retard spoilage and infestation by vermin.

In general, the darker the pit fill, the higher the yield of artifacts, animal bones, and charred vegetal foods. Within stratified pits, the darker layers usually produced the most material. But some relatively light colored pits also contained considerable refuse.

In addition to pits and hearths, other kinds of features included a cache of Madison points, in a shallow depression in subsoil just below plow line, associated with House 4; the lower portion of a whole pottery vessel, buried in the subsoil just inside the east end of House 1; and a series of rather nondescript depressions, oval, circular, or irregular in outline. The depressions varied from one to more than 4 feet in diameter, and most were fewer than 5 inches

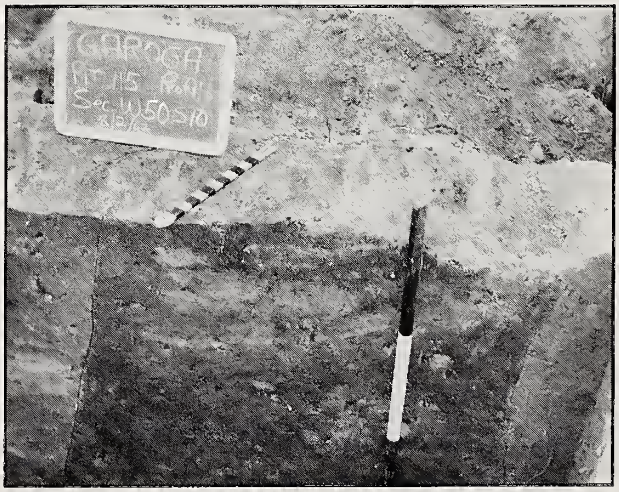

Figure 57. Photograph of cross-sectioned storage pit, Feature 115, Garoga site.

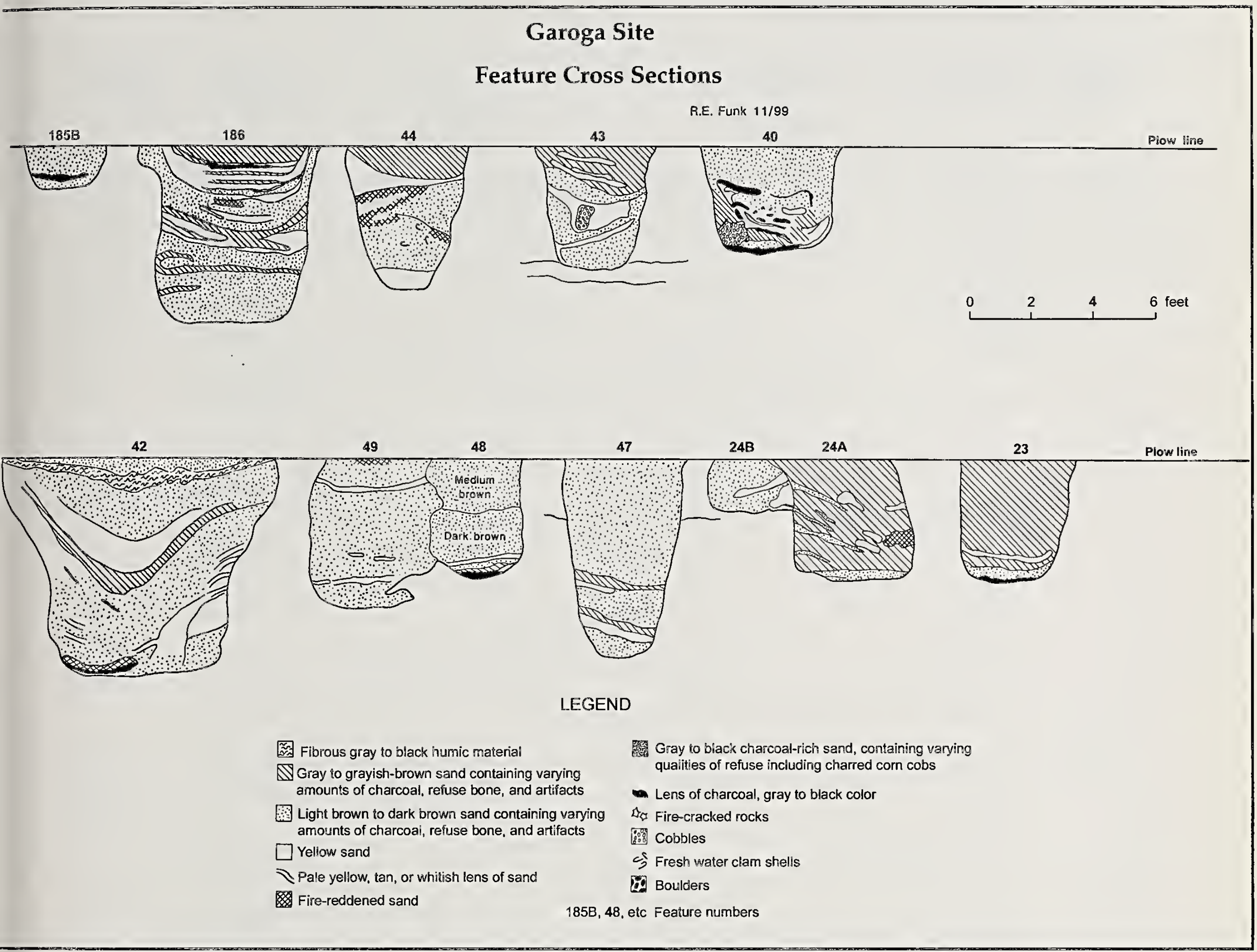
Garoga Site
Feature Cross Sections
R.E. Funk 11/99
185B
186
44
43
40
Plow line
0 2 4 6 feet
42
49
48
Medium brown
Dark brown
47
24B
24A
23
Plow line
LEGEND
Fibrous gray to black humic material
Gray to grayish-brown sand containing varying amounts of charcoal, refuse bone, and artifacts
Light brown to dark brown sand containing varying amounts of charcoal, refuse bone, and artifacts
Yellow sand
Pale yellow, tan, or whitish lens of sand
Fire-reddened sand
Gray to black charcoal-rich sand, containing varying qualities of refuse including charred corn cobs
Lens of charcoal, gray to black color
Fire-cracked rocks
Cobbles
Fresh water clam shells
Boulders
185B, 48, etc Feature numbers

Figure 58. Graphic showing drawn profiles of selected features, Garoga site.

deep. Their fill was ordinarily unstructured brown sand.

Not classified as distinct features were rather amorphous midden concentrations, roughly 3 to 5 feet across and about 3 to 6 inches deep, observed just below the plow zone. Composed principally of dark brown to black soil, containing moderate quantities of refuse, they were usually associated with pits. Most of them occurred within House 1. They probably represented portions of the original ground midden accumulated on house floors, later plowed away except for deeper parts.

Table 27 lists final number assignments of Garoga site features. It will be noted that some numbers are no longer in use; numbers apply to 459 actual features out of the total of 467 listed. Where feasible, associations of features with houses are given. Measurements of feature diameters are presented. In some cases precise measurements could not be determined, because features were not completely uncovered, had rather amorphous outlines, or intersected other features. In a small number of instances, the data are not available in the field notes. For a majority of features, even where the diameters are known, diameters must be considered approximate. That is because many features tended to be largest at the mouth, narrowing to varying degrees below the junction with the plow zone. Precise dimensions could not be determined without excavation. Depth measurements, therefore volumes, are available for the relatively small number of excavated features.

Table 27. Garoga Site List of Features

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
1	W10N40	No	House 9	Pit	42 x 48	
2	W10N40	Yes	House 9	Pit	42 x 48	
3	W10N40-50, W20N40-50	No	House 9	Pit	72	
4	W20N40	Yes	House 9	Pit or hearth	42 x 36	
5	W20N30-40	Yes	House 9	Pit	72 x 48	
6	W30N40	Yes	House 9	Pit	36	
7	W20N30-40	Yes	House 9	Pit	54 x 60	
8	W30N40	No	House 9	Pit	27	
9	W30N40- W20N40	No	House 9	Pit	60	
10	W30N30-40, W20N30	Yes	House 9	Pit, cylindrical	44/54	82,067
11, 11A	W30N30	Yes	House 9	Pit, cylindrical	37/58	59,000
12	W80S20	Yes	House 1	Pit, cylindrical	40/76	95,456
13	W80S20	Yes	House 1	Pit, bell	36 x 24/30	
14	W80S20- W70S20	Yes	House 1	Pit, cylindrical	43/84	127,660
15	W80S20- W80S10	Yes	House 1	Pit, cylindrical	52/66	140,094
16	W90S10-20, W80S10-20	Yes	House 1	Pit, cylindrical	40/64	80,384
17	W90S10-20, W80S10-20	Yes	Between 1 and 9	Pit, cylindrical	49/74	139,475
18	W80S10- W80N0	Yes	Between 1 and 9	Pit	60	
19	W80N0	Yes	Between 1 and 9	Hearth	34/10, basin	2,994
20	W80N0	Yes	Between 1 and 9	Pit, cylindrical	40/68	85,408
21	W80N0-N10	Yes	Between 1 and 9	Pit, cylindrical	60/60	169,560
22	W80N10	Yes	House 9	Pit, cylindrical	49/45	84,815

Table 27—*Continued*

Number	Section	Excavated?	House or Other Assignment	Description	Diameter/ Depth (in.)	Volume (in.^{3})
23	W80N10-20	Yes	House 9	Pit, cylindrical	44/46	69,908
24A	W80N20- W80N30	Yes	House 9	Pit	36	
24B	W90N20- W80N20	Yes	House 9	Pit	Ca. 30	
25	W80N20-30, W70N20-30	Yes	Cluster between ends of 9	Pit, basin, conoidal	40/32	13,263
26	W70S10- W80S10	Yes	House 1	Pit, basin, conoidal	51/21	14,150
27	W80N10- W90N10	Yes	House 9	Pit	30	
28	W80N30	Yes	Between ends of 9	Pit	30 x 36	
29-29A	W80N40	Yes	Between ends of 9	Pit	60	
30	W80N30-N40	Yes	Between ends of 9	Pit, cylindrical	59/66	186,516
31	W80N30-40, W70N30	Yes	Between ends of 9	Pit	60/81	228,906
32	W80N40	Yes	Between ends of 9	Pit	40/17	21,352
33	W80N40-50, W70N50	Yes	Between ends of 9	Pit	60/72	203,472
34	W80N50	No	Between 9 and north bank	Hearth	48 x 54	
35A	W70N30-0 W80N3	Yes	Between ends of 9	Pit	36	
35B	W70N30- W80N30	Yes	Between ends of 9	Pit	36 x 24	
36	W30N20-30, W20N20-30	Yes	House 9	Pit, cylindrical	48/58	104,490
37	W40N30-40, W30N30-40	Yes	House 9	Pit, cylindrical	37/63	67,704
38	W60N20-30	Yes	Between ends of 9	Pit, cylindrical	47/31	53,756
39	W70N30	Yes	Between ends of 9	Pit, cylindrical	45/48	76,302
39A	W70N30	Yes	Between ends of 9	Hearth, shallow basin	29/9	1,960

Continued on next page

Table 27—*Continued*

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
40	W70N20-30	Yes	Between ends of 9	Pit, cylindrical	52/39	82,783
40A	W70N30-W70N20	Yes	Between ends of 9	Pit	Ca. 36	
41	W70N30	Yes	Between ends of 9	Pit, cylindrical	39/32	38,207
41A	W70N30	Yes	Between ends of 9	Pit?	36	
42	W70N30-40	Yes	Between ends of 9	Pit, funnel shaped	105, base 62, 82	229,754
43	W40N30	Yes	House 9	Pit, cylindrical	44/44	66,869
44	W70N40-W60N40	Yes	Between ends of 9	Pit, conoidal	47/56	32,045
45	W50N20-30	Yes	House 9	Pit, cylindrical	48/54	97,667
46	W60N30-40	Yes	Between ends of 9	Pit, basin	38/20	7,481
47	W60N30-40	Yes	Between ends of 9	Pit, conoidal	46/76	41,659
48	W70N20	Yes	House 9	Pit, cylindrical	34/45	40,836
49	W70N20-W80N20	Yes	House 9	Pit, cylindrical	44/56	85,107
50	W70N10-N20	Yes	House 9	Pit, cylindrical	45/39	61,995
51	W70N20, W60N20?	Yes	House 9	Pit	?	
52	W50N30-40	Yes	House 9	Pit	36	
53	W70S30-40, W30S30-40	No	Between 1 and 8	Pit	54	
54	W90S40-50, W80S40-50	No	Between 1 and 8	Pit	48	
55	W80S50	No	House 8	Pit	20	
56	W80S50	No	House 8	Pit	30	
57	W80S50	No	House 8	Pit	33	
58	W80S50	No	House 8	Pit	?	
59	W80S50-60	No	House 8	Pit	36 x 42	
60	W70S60-W80S60	No	House 8	Pit	60	

Table 27—*Continued*

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
61	W80S60	No	House 8	Pit	36 x 48	
62	W80S60	No	House 8	Hearth	36	
63	W80S60	No	House 8	Pit	54 x 48	
64	W80S60-70	No	House 8	Pit	42 x 36	
65	W80S60-70, W70S60-70	No	House 8	Pit	48 x 45	
66	W70S70-W80S70	No	Between 8 and south	bank	Pit	42
67	W70S70-W80S70	No	Between 8 and south bank	Pit	72 x 48	
68	W80S70	No	Between 8 and south bank	Pit	60 x 48	
69	W80S70-W90S70	No	Between 8 and south bank	Pit	50	
70	W50S20-W60S20	No	House 1	Pit	54	
71	W60N10	Yes	Between 1 and 9	Hearth	42 x 24	
72	W60S20	Yes	House 1	Pit or hearth	36 x 30	
73	W60S20	Yes	House 1	Pit, bell-cylindrical	54/78	178,547
74	W70S20	No	House 1	Pit	36 x 30	
75	W60N10	No	Between 1 and 9	Pit	36 x 24	
76	W50N0-W60N0	Yes	Between 1 and 9	Pit	36	
77	W60N0	Yes	Between 1 and 9	Pit	66	
78	W60S10-N0	No	Between 1 and 9	Pit	54 x 60	
79	W60S10	No	House 1	Pit	36	
80	W60S10	No	House 1	Pit	30 x 24	
81	W170S70	No	House 8	Pit	45 x 30	
82	W170S70	Yes	House 8	Pit, cylindrical	54 x 60	
83	W170S70-W180S70	No	House 8	Pit	66 x 60	

Continued on next page

Table 27—*Continued*

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
84	W180S70	No	House 8	Pit	48	
85	W180S70-80	Yes	House 8	Pit, cylindrical	42	
86	W180S70	No	House 8	Pit	36	
87	W180S70-W190S70	No	House 8	Pit	42 x 48	
88	W190S70	Yes	Between 8 and stockade	Pit	36 x 42	
89	W200S70	Yes	Between 8 and stockade8	Pit, cylindrical	42/48	66,46
90	W220S70-W230S70	No	House 13	Pit	48 x 36	
91	W60N20	No	House 9	Pit	48 x 36	
91A	W50N20-W60N20	No	House 9	Pit	34 x 36	
92	W60N20	No	House 9	Pit	48	
93	W230S70-W240S70	Yes	House 13	Pit, cylindrical	37/60	64,480
94	W240S70-80	No	House 13	Pit	72	
95	W240S70	No	Between 12 and 13	Pit	48 x 54	
96	W230S80	No	House 13	Pit	?	
97	W250S70	No	House 13	Hearth	42 x 30	
98	W230S70	No	House 13	Pit	66 x 36	
99	W50N0	No	Between 1 and 9	Pit	30	
100	W50N0-N10	No	Between 1 and 9	Pit	66	
101	W50N10	No	Between 1 and 9	Pit	72 x 66	
102	W220S60	Yes	House 12	Pit, basin	28/16	3,250
103	W210S50-W200S50	No	House 12	Pit	66	
104	W260S70	No	Between 12 and 13	Hearth?	30 x ?	
105	W50S20	No	House 1	Pit	36	

Table 27—*Continued*

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
106	W220S80	No	House 13	Pit	36	
107	W220S80-90	No	House 13	Pit	36	
108	W170S80	Yes	House 8	Pit	?	
109	W220S50-W230S50	No	House 12	Pit	54 x 60	
110	W220S50	No	House 12	Pit	42	
111	W40N50-W50N50	No	Between 9 and north bank	Pit	52	
112	W30N50-W40N50-60	No	Between 9 and north bank	Pit	48	
113	W40N40-W50N40	Yes	House 9	Pit	48	
114	W40S10	No	House 1	Pit	36	
115	W50S10	Yes	House 1	Pit, cylindrical	36/54	54,937
116	W50S10	No	House 1	Pit	?	
117	W50S10-20	No	House 1	Pit	48 x 42	
118	W30N0-N10	No	Between 1 and 9	Pit	39 x ?	
119	W30N0	No	Between 1 and stockade	Pit	36	
120	W30S10	No	House 1	Pit	36 x 42	
121	W190S80	No	Between 8 and stockade	Pit	36 x ?	
122	W10N60-E0N60	No	House 9	Pit	?	
123	W10N20	No	Between 1 and 9	Pit	42	
124	W30S10-20	No	House 1	Pit	60 x 36	
125	W40S10-W30S10	No	House 1	Pit	?	
126, 126A	W20N50, W30N50	No	House 9	Pit	57 x 36	
127	W10N50	No	House 9	Pit	60	

Continued on next page

Table 27—*Continued*

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
128	W20N0	No	House 1	Pit or hearth	30	
129	W40S20	No	House 1	Pit	60	
130	W40S20-W30S20	No	House 1	Pit	72 x 78	
131	W30S20	No	House 1	Pit	36	
132	W30N50	No	Between 9 and north bank	Pit	36 x 48	
133	W40N40	No	House 9	Pit	60 x 48	
134	W50S10-20	No	House 1	Pit	60 x 42	
135	W20S30	No	Between 1 and 8	Pit	42	
136	W20S30-40, W10S30-40	No	Between 1 and 8	Pit	?	
137	W20S20-30, W10S20-30	No	Between 1 and 8	Pit	78 x ?	
138	W20S10-20	No	House 1	Pit	?	
139	W10S10-20	No	House 1	Pit	72 x 60	
140	W10N0-S10	No	House 1	Pit	?	
141	W2N0-S10, W10N0-S10	No	House 1	Pit	?	
142	W10N0-W20N0	No	House 1	Pit	60 x 42	
143	W40S10-20	No	House 1	Pit	60 x 54	
144	W40S10	No	House 1	Pit	72	
145	W20S10-W10S10	No	House 1	Pit	48 x 36	
146	W190S80-W200S80	No	Between 8 and stockade		Pit	?
147	W20S40-W30S40	No	House 8	Pit	?	
148	W40S40-50	No	House 8	Pit	42	
149	W50S40-W60S40	No	House 8	Pit	60	

Table 27—*Continued*

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
150	W60S40-50	No	House 8	Pit	36	
151	W10S10-20, E0S10-20	No	House 1	Pit	?	
152	W10S10	No	House 1	Pit	30	
153	W90S10-20	No	House 1	Pit	42	
154	W100S10-20, W90S10-20	No	House 1	Pit	54	
155	W90S20	No	House 1	Pit	42 x 30	
156	W90S20, W100S20	No	House 1	Pit	30	
157	W90S20-30, W100S30	No	House 1	Pit	38	
158	W90S30	No	House 1	Pit	48	
159	W100S30	No	House 1	Pit	48 x 60	
160	W100S30	No	House 1	Pit	72 x 60	
161	W100S20	No	House 1	Pit	39	
162	W110S20, W10020	No	House 1	Pit	60	
163	W110S20	No	House 1	Pit	30	
164	W110S20	No	House 1	Pit	60 x 48	
165	W110S30	No	House 1	Pit	54 x 60	
166	W110S30	No	House 1	Pit	36 x 24	
167	W120S20, W110S200	No	House 1	Pit	6	
168	W120S20- W110S20, W120S10- W110S10	No	House 1	Pit	30	
169	W120S20	No	House 1	Pit	36 x 30	
170	W120S20	No	House 1	Hearth	48 x 36	
171	W120S30	No	House 1	Pit	24	

Continued on next page

Table 27—*Continued*

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
172	W130S20	No	House 1	Pit	36 x 30	
173	W130S20-30	No	House 1	Pit	42 x 48	
174	W130S30-40	No	House 1	Pit	36	
175	W130S30	No	House 1	Hearth	18 x 24	
176	W140S40-W130S40	No	House 1	Pit	36	
177	W140S20-30	No	House 1	Pit	?	
178	W110S20-30	No	House 1	Hearth	27 x 24	
179	W260S70	No	House 13	Pit	42 x 30	
180	W120S30	No	House 1	Pit	42 x 30	
181	W60S40	No	Between 8 and stockade	Hearth	24+	
182 (not used)						
183	W200S70	No	Between 9 and stockade	Pit	72 x 66	
184	W190-W180S50	No	Between 1 and stockade	Pit	84 x 66	
185	E40-E50S20	Yes	Overlapped south wall 7	Pit, cylindrical	48	
185A	E50S20	Yes	Overlapped south wall 7	Pit, cylindrical	30 x 18	
185B	E50S20	Yes	Overlapped south wall 7	Pit, basin	32	
186A	E40-E50S20	Yes	House 3	Pit	?	
186B	E40-E50S20	Yes	House 3	Pit	?	
187	E20N10	No	Overlapped west wall 7	Pit	24 x 30	
188	E20S20	Yes	Between 1 and 8	Pit	36 x 42	
189	E0S20	Yes	Ditto	Pit, cylindrical	38/48	54,410
190	W10S60	Yes	Between 8 and 11	Pit, cylindrical	66/30	102,584

Table 27—*Continued*

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
191	E10N0	No	Between 1 and 7	Pit	42 x 36	
192	E30S20	No	House 7	Pit	27	
193	E280S60	Yes	Between east end 4 and bank	Pit, cylindrical	30	
194	E40S20-30	Yes	Between 7 and 11	Pit, cylindrical	42/42	58,159
195	E60S20	Yes	Between 2 and 7	Pit, cylindrical	38/30	34,000
196	E100S60	Yes	House 2	Pit, cylindrical	72 (top), 60 middle, 66 deep	88,632
197	W190S50	Yes	Between 1 and stockade	Pit, cylindrical	46/63	104,647
198	E260S50	No	House 4	Pit	36	
199	E40S80	Yes	House 11	Pit, cylindrical	36/34	34,590
200	W20S60	Yes	House 8	Pit, cylindrical	42/60	83,084
201	E210S50	Yes	House 5	Pit	30 x 18	
202	W10S60	Yes	Overlapped west end 3	Pit, cylindrical	42	
203	E140S40	No	House 5	Pit	36 x 36	
204	E180S30	No	House 5	Pit	60 x 48	
205	E250-E260S40	No	House 5	Pit	?	
206	E190S40	No	House 5	Pit	48 x ?	
207	E80S30	No	House 2	Pit	36	
208	E270S50	No	House 4	Pit	24	
209	E0S60	No	House 11	Pit	42	
210	E0S60-70	No	House 11	Pit	42	
211	E40S80	No	House 11	Pit	42	
212	E100-E110S30	No	House 3	Pit	42 x 48	
213	E20-E30S80	No	House 11	Pit	?	
214	E70S20	No	Between 2 and 7	Pit	48 x 30	

Continued on next page

Table 27—*Continued*

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
215	E0S60	No	Overlapped west end 11	Pit	?	
216	E0S60	No	House 11	Pit	36	
217	E0-E10S70	No	House 11	Pit	22 x 30	
218	E0-E10S70	No	House 11	Pit	36	
219	E10S60-70	No	House 11	Pit	36	
220	E10S60-70	No	House 11	Pit	48	
221	E0S50-60, E10S50-60	No	Between 1 and 11	Pit	72 x 48	
222	E20S60	No	Between 1 and 11	Pit	54	
223	E20S60-70, E30S60-70	No	Between 1 and 11	Pit	48	
224	E30S60-70	No	House 11	Pit	48 x 60	
225	E40S60-70, E30S60-70	No	House 11	Pit	27	
226	E30S70	No	House 11	Pit	48 x 42	
227	E30S60	No	Between 1 and 11	Pit	48 x ?	
228	E40S60-70	No	House 11	Pit	24 x 30	
229	E40S70	No	House 11	Pit	36	
230	E30S80	No	House 11	Pit	?	
231	E60S20-30	No	Between 2 and 7	Pit	?	
232	E50S80	No	House 11	Pit	30 x 36	
233	E50S80	No	House 11	Pit	30 x 36	
234	E0S10-20	No	House 1	Pit	60	
235	E20S10	No	Between 1 and 7	Pit	36 x 30	
236	E10-E20S10	No	Between 1 and 7	Pit	54	
237	E10S20-30	No	Between 1 and 8	Pit	60 x ?	
238	E10S20-E20S20	No	Between 1 and 8	Pit	78 x 66	
239	E20S20-30	No	Between 1 and 8	Pit	?	

Table 27—*Continued*

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
240	E30S20-E40S20	No	House 7	Pit	32	
241	E40S20	No	Between 7 and 11	Pit	24 x 36	
242	E40-E50S30	No	Between 7 and 11	Pit	66	
243	E50S30	No	Between 7 and 11	Pit	60 x ?	
244	E50S30	No	Between 7 and 11	Pit	48	
245	E70S20	No	Between 2 and 7	Pit	36 x 42	
246	E70S20-30	No	Between 2 and 7	Pit	48 x 54	
247	E70S30	No	Between 2 and 7	Pit	38 x 36	
248	E70S20	No	House 2	Pit	36 x 42	
249	E80S20	No	House 2	Pit	36 x ?	
250	E80S30	No	House 2	Pit	36 x 30	
251	E80S30	No	House 2	Pit	48 x ?	
252	E90S20	No	House 2	Pit	48	
253	E90S30	No	House 2	Pit	42 x ?	
254	E100S40	No	Between 2 and 3	Pit	42	
255	E100-E110S20	No	House 3	Pit	42 x ?	
256	E100S20-30, E110S20-30	No	House 3	Pit	44 x ?	
257	E110S20	No	House 3	Pit	48 x 36	
258	E110S40-E12S40	No	House 3	Pit	?	
259	E110S40	No	House 3	Pit	42	
260	E110S40	No	House 3	Pit	36 x 42	
261	E100S40-50, E110S40-50	No	Between 2 and 3	Pit	54 x ?	
262	E100S40	No	Between 2 and 3	Pit	42	
263	E110S40-50	No	House 3	Pit	42	
264	E110S50	No	House 3	Pit	36 x 42	
265	E110S50-60	No	House 3	Pit	48 x 54	

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Table 27—*Continued*

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
266	E100S40-50	No	Overlapped east wall 2	Pit	48 x ?	
267	E100S50	No	House 2	Pit	30 x 39	
268	E100S50-60	No	House 2	Pit	48 x 42	
269	E90S50-60	No	House 2	Pit	45 x 60	
270	E100S60	No	House 2	Pit	60 x 54	
271	E110S70	No	Overlapped west wall 3	Pit	60 x 48	
272	E90S70	No	House 2	Pit	60 x 54	
273	E90S80	No	House 2	Pit	42	
274	E100-E110S70	No	House 2	Pit	39	
275	E100-E110S80	No	House 2	Pit	36	
276	E90S80	No	House 2	Pit	42	
277	E120S30-40	No	Between 3 and 4	Pit	54 x 42	
278	E120S30-40	No	Between 3 and 4	Pit	36 x 24	
279	E120S20-30	No	Between 3 and 4	Pit	24 x 20	
280	E130S60-70	No	Between 3 and 6	Pit	48 x 60	
281	E130S70	No	Between 3 and 6	Pit	36	
282	E140S70	No	Between 3 and 6	Pit	36 x 48	
283	E150-E160S30	No	House 5	Pit	54 x 36	
284	E160S30	No	House 5	Pit	42 x 36	
285	E150S40	No	House 5	Pit	30 x 36	
286	E150S40	No	House 5	Pit	42 x 32	
287	E160S40-50	No	House 5	Pit	48	
288	E160S40	No	House 5	Pit	48 x 48	
289	E170S30-40	No	House 5	Pit	36	
290	E170S30	No	Between 4 and 5	Pit	36	
291	E160S50-E170S50	No	House 5	Pit	42 x 60	

Table 27—*Continued*

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
292	E170S40	No	House 5	Pit	36	
293	E170S50	No	House 5	Pit	36	
294	E170S50	No	House 5	Pit	36	
295	E170S40-E180s40	No	House 5	Pit	48 x ?	
296	E180S40	No	House 5	Pit	60 x 42	
297	E180-E190S40	No	House 5	Pit	42	
298	E180S40	No	House 5	Pit	36 x 24	
299	E180S40-E190S40	No	House 5	Pit	?	
300	E180S50-60	No	House 5	Pit	42	
301	E180S50-60	No	House 5	Pit	48 x 30	
302	E190S30-40	No	Between 4 and 5	Pit	36	
303	E190S40	No	Between 4 and 5	Pit	33	
304	E190S50-60	No	House 5	Pit	42 x 54	
305	E190S60	No	House 5	Pit	30	
306	E200S60	No	House 5	Pit	48 x 36	
307	E200S60-E210S60	No	House 5	Pit	?	
308	E210S40-50	No	Between 4 and 5	Pit	30	
309	E180S70-80, E190S70-80	No	House 6	Pit	42 x 54	
310	E190S70-80	No	House 6	Pit	36	
311	E200S80	No	House 6	Pit	42 x 36	
312	E180-E190S80	No	House 6	Pit	66	
313	E180S90	No	House 6	Pit	42 x ?	
314	E200S80-90	No	House 6	Pit	72	
315	E190S90-E200S90	No	House 6	Pit	48 x 54	

Continued on next page

Table 27—*Continued*

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
316	E190S100	No	Between 6 and 10	Pit	36	
317	E190S100	No	Between 6 and 10	Pit	54	
318	E180-E190S100	No	Between 6 and 10	Pit	42 x 66	
319	E200S100	No	Between 6 and 10	Pit	48 x 54	
320	E190S110	No	House 10	Pit	48	
321	E190S110	No	House 10	Pit	24	
322	E180-E190S110	No	House 10	Pit	42 x 36	
323	E190S110	No	House 10	Pit	42	
324	E190-E200S110	No	House10	Pit	?	
325	E240S40	No	House 4	Pit	48 x 60	
326	E250S40-50	No	House 4	Pit	42 x 48	
327	E260S40-50	No	House 4	Pit	60 x ?	
328	E260S50	No	House 4	Pit	66 x 54	
329	E300S40-50	No	House 4	Pit	72 x ?	
330	E300S50	No	Between east end 4 and bank	Pit	54	
331	W220S90	No	House 13	Hearth	36	
332	W240-W230S60	No	House 12	Pit	?	
333	W180S20-30	No	House 9	Pit	72	
334	W170S20	No	House 9	Pit	?	
335	W170S20-30	No	House 9	Pit	30 x ?	
336	W180S30	No	House 9	Pit	60 x 48	
337	W180S30	No	House 9	Hearth?	36 x 48	
338	W160S30	No	Near south. wall 9	Pit	48 x 30	
339	W140S30-40	No	Between 1 and stockade	Pit	84 x 48	
340	W160-W150S40	No	Between 1 and stockade	Pit	54 x 48	
341	W150S50	No	House 8	Pit	48 x ?	

Table 27—*Continued*

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
342	W160S40	No	Between 1 and stockade	Pit	24 x 18	
343	W160-W170S40	No	Between 1 and stockade	Pit	36	
344	W170S40	No	Between 1 and stockade	Pit	30	
345	W170S40-50	No	Between 1 and stockade	Pit	54	
346	W170S50-60	No	House 8	Pit	48 x ?	
347	W50S50-60	No	House 8	Pit	60	
348	W40-W30S50	No	House 8	Pit	42	
349	W30S50	No	House 8	Pit	60 x 42	
350	W20S50	No	House 8	Pit	54 x 36	
351	W10-W20S50	No	Between 7 and 8	Pit	30 x ?	
352	E0S50-W10S50-60	No	Between 1 and 11	Pit	36 x ?	
353 (not used)						
354	W10S60	No	Overlapped west end 11	Pit	24	
355	W30S60-W20S60	No	House 8	Pit	102 x ?	
356	W40S60	No	House 8	Pit	30 x ?	
357 (not used)						
358	E0S20	No	Between 1 and 8	Pit	36 x 33	
359	E110S30-40	No	House 3	Pit	66 x ?	
360	E0-E10S10	No	House 1	Pit	36 x 30	
361	W50S20	No	House 1	Pit		
362	E0N20	No	Between 1 and 9	Pit		
363	E0N20-30	No	Between 1 and 9	Pit		
364	E0N20	No	Between 1 and 9	Pit		
365	E0N10-20	No	Between 1 and 9	Pit		

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Table 27—*Continued*

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
366	E10N20	No	Between 1 and 9	Pit		
367	E0N0	No	House 1	Pit		
368	E20N10	No	House 1	Pit	12 x 15	
369	E20N10	No	House 1	Pit	18	
370	Location of numbers 370–379 within grid system not known. All in Student Tests. Alternate numbers 456–466 on map for location only.	No		Pit		
371	No	Pit				
372	No	Pit				
373	No	Pit				
374	No	Pit				
375	No	Pit				
376	No	Pit				
377	No	Pit				
378	No	Pit				
379	No	Pit				
380 (not used)						
381 (not used)						
382	W50N50	No	Between 9 and north bank	Hearth	48 x 20	
383	W20N40	Yes	House 9	Hearth		
384	E90S20	No	House 2	Hearth		
385	E20S10-20	No	Between 1 and 8	Pit		
386	E10S10	No	Between 1 and 8	Hearth	24 x 30	
387	E0-E10S10	Yes	House 1	Hearth	30	

Table 27—*Continued*

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
388	E0S10	Yes	House 1	Hearth	36 x 32	
389	W10S10	No	House 1	Hearth	36	
390	W10S10	No	House 1	Hearth	18	
391	W30S10	No	House 1	Hearth	36 x 30	
392	W30-W40S10	No	House 1	Hearth	36	
393	W40-W30S10	No	House 1	Hearth		
394	W40-W30S10	No	House 1	Hearth		
395	W10N10	No	Between 1 and 9	Hearth		
396	E0-E10N10	No	Between 1 and 9	Hearth		
397	E0N10	No	Between 1 and 9	Hearth		
398	E0N10-S10	No	Between 1 and 9	Hearth		
399	E20N0-N10	No	Between 1 and 9	Hearth		
400	E10S10	No	Between 1 and 7	Hearth		
401	W20N0	No	Between 1 and 9	Hearth		
402	W50N0	No	Between 1 and 9	Hearth		
403	W60N20	No	House 9	Hearth		
404	W60S20	No	House 1	Hearth		
405	W70S20	No	House 1	Hearth	30 x 42	
406	W70S10-20	No	House 1	Hearth	42 x 36	
407 (not used)						
408	W80N20	No	House 9	Hearth		
409	W80N20	No	House 9	Hearth		
410	W70S40	No	Between 1 and 8	Hearth		
411	W20N10-N20	No	Between 1 and 9	Hearth		
412	E30N20	Yes	Between 1 and 8	Hearth		
413	E110S30	No	House 3	Hearth		
414	E90S50	No	House 2	Hearth		

Continued on next page

Table 27—*Continued*

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
415	E90-E100S70	No	House 2	Hearth		
416	E110S60	No	Between 2 and 3	Hearth		
417	E100S70	No	House 2	Hearth		
418	E100S80	No	House 2	Hearth	36	
419	E70S80	No	House 11	Hearth	19	
420	E70S80	No	House 11	Hearth	34	
421	E60S80	No	House 11	Hearth		
422	E60S80	No	House 11	Hearth	24	
423	E30S70	No	House 11	Hearth		
424	E30S60	No	House 11	Hearth	30	
425	E0S70	No	House 11	Hearth		
426	E120S30	No	Between 3 and 4	Hearth		
427	E160S40	No	House 5	Hearth		
428	E170S40	No	House 5	Hearth	24	
429	E170S40	No	House 5	Hearth		
430	E180S40	No	House 5	Hearth		
431	E180S40-50	No	House 5	Hearth		
432	E180-E190S40	No	House 5	Hearth		
433	E200S40	No	Between 4 and 5	Hearth		
434	E190-E200S40	No	House 5	Hearth		
435	E250S40	No	House 4	Hearth		
436	E120S60	No	Between 3 and 6	Hearth		
437	E130S60	No	Between 3 and 6	Hearth		
438	E190S80	No	House 6	Hearth		
439	E170S30-40, E180S30-40	No	House 5	Hearth		
440 (not used)						
441	E190-E200S50	No	House 5	Hearth		

Table 27—*Continued*

Number	Section	Excavated?	House or	Description Other Assignment	Diameter/ Depth (in.)	Volume (in.^{3})
442	E200S50	No	House 5	Hearth		
443	E270S50	No	House 4	Hearth		
444	W200S30	No	House 9	Hearth		
445	W180-W190S20-30	No	House 9	Hearth		
446	W180S20	No	House 9	Hearth		
447	W120S30	No	House 1	Hearth		
448	W130S40	No	House 1	Hearth		
449	W100S20	No	House 1	Hearth	36 x 18	
450	W100S20	No	House 1	Hearth	30 x 24	
451 (not used)						
452	W100S20	No	House 1	Hearth		
453	W140-W150S50	No	Between 1 and stockade	Hearth		
454	W230S50	No	House 12	Pit?		
455	W230S50	No	House 12	Pit?		
456	Student Test 3	No	House 8	Hearth		
457	Student Test 4	No	House 8	Pit		
458	Student Test 4	No	House 8	Pit		
459	Student Test 4	No	House 8	Pit		
460	Student Test 3	No	House 8	Pit		
461	Student Test 3	No	House 8	Pit		
462	Student Test 2	No	House 8	Pit		
463	Student Test 1	No	House 8	Pit		
464	Student Test 1	No	House 8	Pi		
465	Student Test 1	No	House 8	Pit		
466	Student Test 1	No	House 8	Pit		
467	W260S70	No	House 13	Pit?		

A number of features that had been assigned numbers in the field cannot be shown as outlines on field-note floor plans, even though their grid locations are known. The relevant information is lacking for Features 45, 52, and 125. Features 362 through 365 are on the floor plans, therefore their grid locations are known and their outlines are shown, but which number is associated with which feature cannot be determined.

Not appearing on Table 27 are features located within those portions of Houses 2, 3, 4, and 7 that were uncovered by stripping the topsoil with a front-end loader and mapped using plane table and alidade. They appear as points on the plane table map, therefore their oral outlines, measurements and exact placement in 10-foot squares within the grid system are not known. There were approximately 30 of these features, both pits and hearths, and these bring the total for the excavated portions of the site to nearly 490.

THE LOCATIONS OF FEATURES INSIDE AND OUTSIDE OF HOUSES

House 1. Features 12–16, 26, 70, 72–74, 79, 80, 105, 114–117, 120, 124, 125, 128–131, 134, 138–145, 151–178, 180, 234, 360, 361, 367–369, 387–394, 404–406, 447–450, 452.

Central hearths: Features 156, 178, 387–392, 394, 404–406, 447–450, 452.

Excavated features: 12–16, 26, 72, 73, 115, 387, 388.

Between House 1 and stockade: Features 119, 184, 197, 339, 340, 342–345, 453. Excavated feature: 197.

Between Houses 1 and 8: Features 53, 54, 135–137, 188, 189, 237–239, 358, 385, 386, 410, 412. Excavated features: 188, 189, 412.

Between Houses 1 and 7: Features 191, 235, 236, 400.

House 2. Features 196, 207, 248–253, 267–270, 272–276, 384, 414, 415, 417, 418.

Central hearths: Features 414, 415, 417, 418.

Excavated feature: 196.

Overlapping east wall of House 2: Feature 266.

House 3. Features 186A, 186B, 212, 255–260, 263–265, 359, 413.

Central hearths: none observed within excavated area.

Excavated features: 186A, 186B.

Overlapping west wall of House 3: Feature 271.

Between Houses 2 and 3: Features 254, 261, 262, 416.

House 4. Features 198, 208, 325–329, 435, 443.

Central hearths: Features 435, 443.

Between east end House 4 and bank: Features 193, 330. Excavated feature: 193.

Between Houses 3 and 4: Features 277–279, 426.

House 5. Features 201, 203–206, 283–289, 291–301, 304–307, 427–432, 434, 439, 441, 442.

Central hearths: Features 427, 429, 430, 431, 439, 441, 442.

Excavated feature: 201.

Between Houses 4 and 5: Features 290, 302, 303, 308, 433.

House 6. Features 309–315, 438.

Central hearths: Feature 438.

Between Houses 3 and 6: Features 280–282, 436, 437.

House 7. Features 192, 240.

Central hearths: none exposed within excavated area.

Overlapping west wall of House 7: Feature 187.

Overlapping south wall of House 7: Features 185, 185A, 185B. Excavated features: 185, 185A, 185B, 202.

Between Houses 7 and 11: Features 194, 241–244. Excavated feature: 194.

Between Houses 2 and 7: Features 195, 214, 231, 245–247. Excavated feature: 195.

House 8. Features 55–65, 81–87, 108, 147–150, 200, 341, 346–350, 355, 356, 456–466.

Central hearths: none identified within excavated areas.

Excavated features: 82, 85, 108, 200.

Between House 8 and stockade: Features 88, 89, 121, 146, 181. Excavated features: 88, 89.

Between House 8 and bank: Features 66–69.

Between Houses 7 and 8: Feature 351.

Between Houses 8 and 11: Feature 190. Excavated feature: 190.

House 9. Features 1–11A, 22–24B, 27, 36, 37, 43, 45, 48–52, 91, 91A, 92, 113, 122, 126, 126A, 127, 133, 333–337, 383, 403, 408, 409, 444–446.

Central hearths: Features 403, 408, 409, 444–446.

Excavated features: 2, 4–7, 10–11A, 22–24B, 27, 36, 37, 43, 45, 48–52, 113, 383.

Cluster between ends of House 9: Features 25, 28–33, 35A, 35B, 38–42, 44, 46, 47. Excavated features: 25, 28–33, 35A, 35B, 38–42, 44, 46, 47.

Between House 9 and stockade: Feature 183.

Outside south wall of House 9: 338.

Between House 9 and north bank: Features 34, 111, 112, 132, 382. Excavated feature: none.
Between Houses 1 and 9: Features 17–21, 71, 75–78, 99–101, 118, 123, 362–366, 395–399, 401, 402, 411. Excavated features: 17–21, 71, 76, 77.

House 10. Features 320–324.
Central hearths: none exposed within excavated area.
Between Houses 6 and 10: Features 316–319.

House 11. Features 199, 209–211, 213, 216–220, 224–226, 228–230, 232, 233, 419–425.
Central hearths: Features 419, 422–426.
Excavated feature: 199.
Overlapping west end of House 11: Features 215, 354.
Between Houses 1 and 11: Features 221–223, 227, 352.

House 12. Features 102, 103, 109, 110, 332, 454, 455.
Central hearths: none identified within excavated area.
Excavated feature: 102.

House 13. Features 90, 93, 94, 96–98, 106, 107, 179, 331, 467.
Central hearths: none exposed within excavated area.
Excavated feature: 93.
Between Houses 12 and 13: Features 95, 104.

ARTIFACTS

Because Ritchie and Funk (1973:324–329) presented a trait table, artifact descriptions, and an analysis for the Garoga site in their original report, we did not conduct a complete reanalysis of the entire collection. Funk reevaluated the lithics from the site, and Kuhn updated the pottery rim sherd typology and ceramic pipe descriptions. Other artifact classes were not reconsidered, and the trait table for these categories is simply reproduced from the 1973 report.

Pottery

The following list (Table 28) of pottery traits is repeated directly from Ritchie and Funk (1973:327–328) but transposed into categories that match those used for the Klock and Smith-Pagerie sites, to facilitate appropriate comparisons. References back to the original categories used by Ritchie and Funk, where necessary, are included in parentheses.

Table 28. Garoga Site Ceramic Trait List

Ceramics	
Pottery	
Complete rim sherds	546
Incomplete rim sherds	2,172
Neck and shoulder sherds	151
Plain body sherds	9,315
Check stamped body sherds	77
Juvenile fragments (miniature vessel fragments)	29
Pipes	
Stem fragments (including strap handle)	52
Bowl fragments	20
Juvenile fragments (crude bowl fragments)	3
Other	
Ceramic disks	1
Ceramic maskette	1

Table 29 presents Kuhn's analysis of the pottery rim sherd types represented in the collection at the New York State Museum. Only entire rim sherds complete from the lip to the base were included in the analysis. Therefore the total is considerably less than the sample presented in Funk's original analysis (Ritchie and Funk 1973:327). The pottery types defined by Lenig (1965:5–8) have been used to type the rim sherds in the updated table. Most agree that Lenig's types represent a refinement and improvement over MacNeish's (1952:74–80) original Mohawk types, which were used by Funk in his earlier analysis. The current listing can be considered a more accurate typology and one that will prove more useful for comparative purposes. Sherds originally selected for publication by Funk (Ritchie and Funk 1973:Plate 191) are shown in Figure 60.

Table 29. Garoga Site Rim Sherds Listed by Type

Pottery Type		*N*	% of Total
Collared	Chance Incised	6	1.1
	Deowongo Incised	12	2.2
	Garoga Incised	410	75.1
	Wagner Incised	34	6.2
	Martin Horizontal	7	1.3
	Cromwell Incised	10	1.8
	Thurston Horizontal	11	2.0
	Other	29	5.3
Collarless	Otstungo Notched	18	3.3
	Rice Diagonal	9	1.7
Total		546	100

Ceramic Pipes

Of the 20 pipe bowl fragments in the assemblage, only 13 were large and complete enough to be able to assign to a pipe type. These were 1 proto-trumpet pipe (undecorated), 2 trumpet pipes, 2 rimmed trumpet pipes, 7 square (or coronet) trumpet pipes, and a single bulbous pipe bowl (possibly juvenile). Most of the square trumpet pipes have the traditional decoration of horizontal lines on each side with circular punctates or indentations on the squared corners. One has horizontal above vertical lines on the sides. One has a horizontal line above and below a row of punctates on the sides. One has an unusual herringbone pattern.

Most of the pipe stem fragments are round in cross-section and undecorated. Only 2 stem fragments are not round in cross-section. Each is round with one flat side. One of these is undecorated, but the other has cross-hatched incised lines down the flat side of the stem. Other decorated stem fragments include 2 with incising and a third with fingernail impressions randomly placed all over it. The sample of 52 stem fragments includes 1 juvenile pipe stem decorated with incising and lacking a bore hole, and a specimen listed in the original trait list as a "strap handle?" (Ritchie and Funk 1973:327). The junior author has examined this artifact, and it appears to be nothing more than a fragment of a large pipe stem.

There are close correspondences in form and style between the ceramic pipe assemblages from the Garoga, Klock, and Smith-Pagerie sites; however, the Garoga site differs in one respect. The number of pipes recovered from Garoga is significantly larger than the pipe assemblages recovered from the other two sites, even though similar numbers of features were excavated at all three sites.

Table 30. Pipe Assemblages from the Garoga, Klock, and Smith-Pagerie Sites

Site	Number of Pipes	Features Excavated
Garoga	75	89
Klock	23	79
Smith-Pagerie	13	81

Ceramic smoking pipes appear to decline in numbers on eastern Iroquois sites over the course of the sixteenth century. Bradley (1987:61) has noted this pattern among the Onondaga. Wray and Schoff (1953:54) also indicate that ceramic pipes are rare on Seneca sites from this period. It appears that the pipe frequencies for the Mohawk sites in Table 30 also represent a temporal trend.

Stone Tools

Table 31 presents Funk's reanalysis of the stone tool assemblage from the Garoga site. During this reconsideration of the artifact assemblage from Garoga, Funk noted discrepancies between the new study and the previous one (Ritchie and Funk 1973:327-328). This is especially true of the chipped stone industry, for which the projectile point counts differ widely. For example, the 1973 report lists 59 Madison points. The junior author located 47 complete points, which he combined with 5 from another Garoga site collection for the metrical analysis reported in Table 32 and also included in an earlier study of Mohawk projectile points (Kuhn 1996). But Funk's recent tabulation identified 70 Madison points in the collection. No ready explanation comes to mind, but it is possible that part of the collection was missed during preparation of the 1973 publication. In an effort to resolve the discrepancies, Funk has gone over the collections from all three sites—Garoga, Klock, and Smith-Pagerie—several times.

Another reason for the discrepancies is very probably the revision of functional type categories of

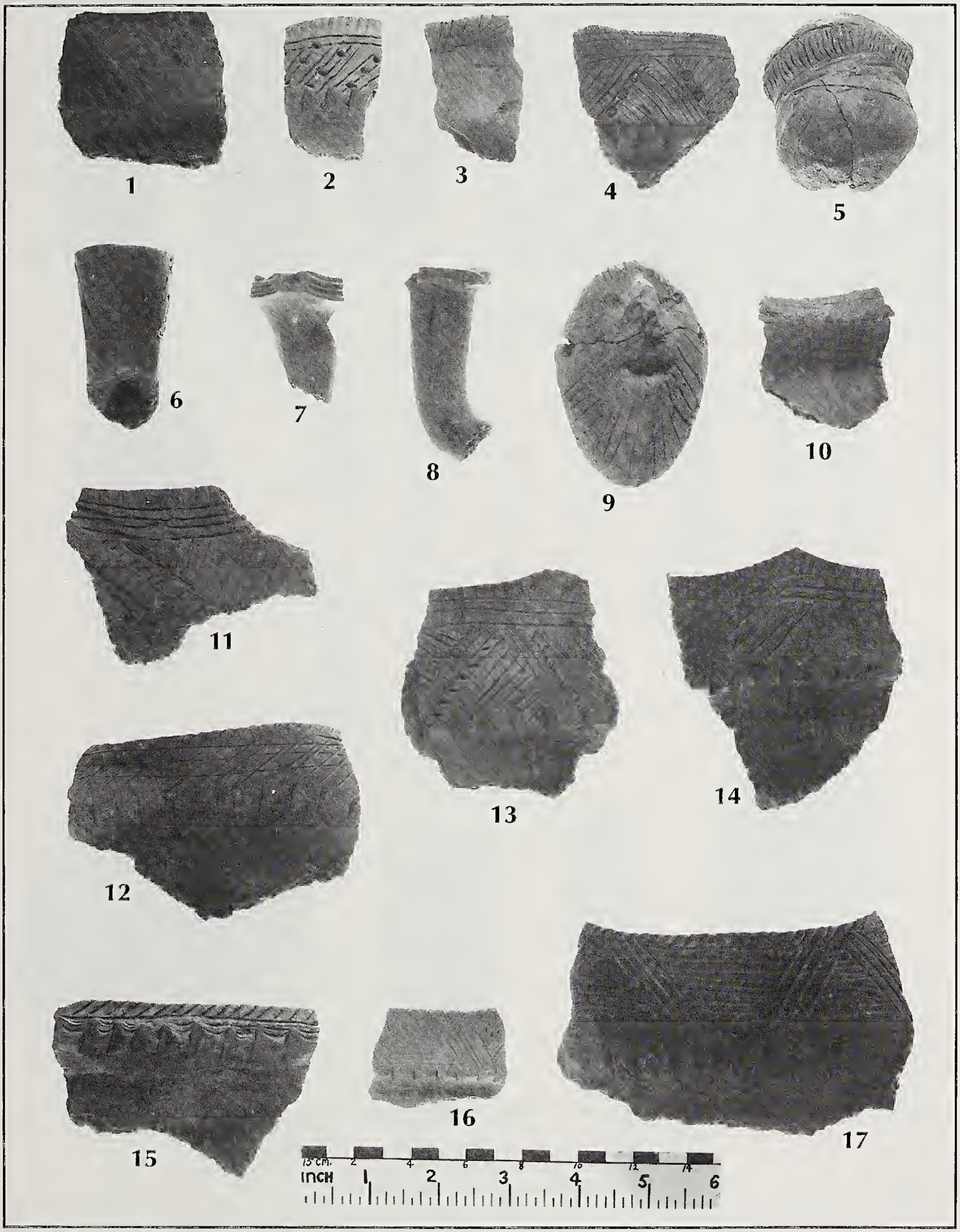
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Figure 60. Photograph of Garoga site ceramics. Key: 1, plain collared rim sherd; 2, 4, punctated variants of Garoga Incised type; 3, 5, juvenile pot fragments; 6, 8, bowls of plain trumpet pipes; 7, portion of trumpet pipe bowl with incised and punctated collar; 9, clay maskette; 10, 15, Otstungo Notched rim sherd; 11, incised collared rim sherd with fillet attached; 12–14, 16, 17, Garoga Incised rim sherds.

bifaces other than projectile points and of rough and polished stone items. The types and counts of rough stone and polished stone items also differ from the 1973 report. Reanalysis from a functional standpoint resulted in the reclassification of, for example, some "hammerstones" into "hammer-anvil-mullers." The current trait list represents Funk's most recent effort. It is believed that the revised typologies and raw counts for Madison and other triangular points, for nonprojectile point biface categories, and for rough and polished stone tools, are more accurate than those of the original Garoga site report.

Table 31. Garoga Site Stone Tool Trait List

Chipped Stone	
Projectile Points	
Triangular	
Madison points, finished	66
Madision points, in process	4
Other triangular points	5
Other	
Lanceolate point (Fox Creek?)	1
Lamoka-like	1
Side-notched	2
Corner-notched	1
Other Bifaces	
Knives, bifacial	
Leaf-shaped "Iroquois"	6
Ovate	7
Bifaces, fragmentary (primarily from triangular points)	18
Bifaces, in process	29
Scrapers, bifacial	2
Drills, triangular-based	2
Drills, expanded-based	2
Drill fragments	3
Strike-a-light	1
Unifaces	
Scraper, end	1
Flakes, retouched	10
Flakes, utilized	59
Debitage	
Cores, flakes	not counted or segregated

Rough Stone	
Hammerstones, cobble	12
Hammer-anvilstones, cobble	4
Hammer-mullers	3
Hammer-anvil-mullers	6
Chopper, ovate	1
Anvilstones, cobble	1
Millingstones	12
Mullers	2
Whetstones	3
Netsinkers, notched	3
Digging slab?, chipped	1
Disks, chipped	3
Pestles, cylindrical	2

Ground Stone	
Celts, whole or fragmentary	24
Celts, in process	12
Chisels	7
Gouge, shallow lip	1
Perforated shale piece	1
Worked soapstone fragment	1
Net spacer	1

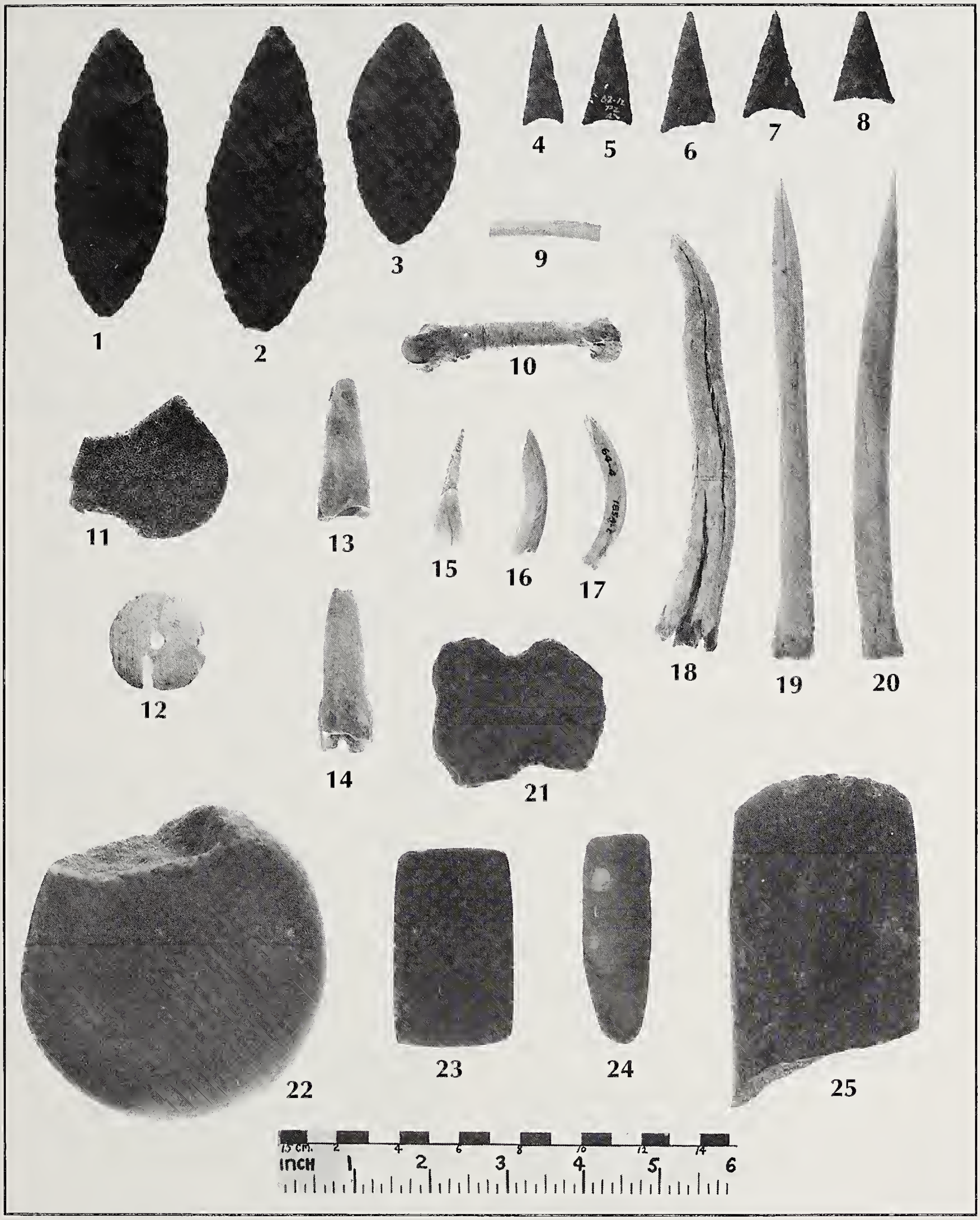


Figure 59. Photograph of stone, bone, antler, and shell artifacts from the Garoga Site. Key: 1–3, bipointed "Iroquoian" biface knives; 4–8, Madison type projectile points; 9, tubular bird bone bead; 10, bead in process on bear metatarsal; 11, spoon?, fashioned from large mammal epiphysial cap; 12, shell disk bead; 13, 14, perforated deer phalangeal bones; 15, elk canine tooth grooved for use as bead; 16, 17, beaver incisor tools with ground incisal edges; 18, antler tine flaking tool; 19, 20, bone splinter awls; 21, notched stone netsinker; 22, muller; 23, net spacer; 24, chisel; 25, celt.

Projectile Points

Most of the finished (Stage-3) triangular projectile points (Figure 59, Nos. 4–8) could readily be assigned to the Madison type (Ritchie 1971:33–34, 88), but a small number, mostly relatively broad compared to the type description, are listed separately. Many of the fragments of bifaces are thin and well-flaked, finished pieces and probably derived from Madison points. Metrical data and weights for the triangular points are presented in Table 32. Statistics for the base shape and side shape of points are presented in Table 33.

There was little evidence of wear on triangulars examined under 5 to 25 magnifications. Tip impact fractures were identified on four points, slight basal rubbing on one, and the tangs (basal corners) were slightly ground (Level 2/3 rounding/gloss) on three specimens. Slight (Level-1–3) rounding/gloss was observed just below tip on one point, on lower edges and base on four points, and on one edge on one point.

Table 32. Descriptive Statistics for Complete Madison Points from the Garoga Site

Attribute	***N***	**Mean**	**Range**	**Standard Deviation**	**Coefficient of Variation**
Length	52	33.7	23.0–47.5	5.9	17.5
Width	52	18.4	12.0–25.5	3.0	16.3
Thickness	52	5.1	3.5–13.5	1.8	35.3
Weight	39	2.18	0.8–5.0	1.1	50.5

Note: Measurements in millimeters, weight in grams. Length, width, thickness statistics include points from the Frey and Richmond collections from Garoga (Kuhn 1996).

Table 33. Base Shape and Side Shape Attributes for the Garoga Site Projectile Points

Base Shape	***N***	**% of Total**	**Side Shape**	***N***	**% of Total**
Concave	42	89	Straight	32	68
Straight	3	7	Excurvate	9	19
Convex	2	4	Incurvate	2	4
Total	47	100	Irregular	4	9
			Total	47	100

Other Bifaces

Descriptive statistics for bifaces, Iroquois knives, and ovate knives are presented in Tables 34, 35, and 36. One of the six "Iroquois knives" (Figure 59, Nos. 1–3) showed heavy basal rubbing. Complete specimens weighed 22, 18, and 41 grams. Of the ovate knives, one showed heavy (Level-5) rounding/gloss on the base, and light (Level-1–2) rounding/gloss was seen on one end or edge of two specimens. The four complete ovate knives weighed 21, 8, 6, and 18 grams. Very little wear of any kind was noted on the bifaces in process.

One of the ovate bifacial scrapers showed very heavy (Level-10) rounding/gloss on the edges. This rubbing effect lapped on to the adjoining faces. No striae were visible.

The relatively heavy bifaces in process could, in the case of the lighter specimens, have been preforms for Madison points, but most of them were almost certainly intended to be ovate knives or Iroquois-style knives.

Table 34. Summary Statistics for Stage-1 Bifaces from the Garoga Site

Statistic	Length	Width	Thickness	Weight
Mean	49.9	29.6	14.9	21.2
Median	51.5	29	15	16
Mode	51	29	18	14
Standard deviation	7.34	4.74	2.23	12.44
Range	23	16	7	36
Minimum	38	20	11	8
Maximum	61	36	18	44
N	10	10	10	11

Note: Measurements in millimeters, weights in grams.

Table 35. Summary Statistics for "Iroquois Knives" from the Garoga Site

Statistic	Length	Width	Thickness
Mean	63.6	33.2	11.8
Median	65	30	10
Mode	65	30	10
Standard deviation	2.8	5.8	4.49
Range	7	14	10
Minimum	59	29	8
Maximum	66	43	18
N	5	5	6

Note: Measurements in millimeters.

Table 36. Summary Statistics for Ovate Knives from the Garoga Site

Statistic	Length	Width	Thickness
Mean	47.7	28.8	8.3
Median	39	29	9
Mode	N/A	N/A	10
Standard deviation	19.5	4.82	1.33
Range	36	11	3
Minimum	34	23	7
Maximum	70	34	10
N	3	5 6	

Note: Measurements in millimeters.

Table 37. Summary Statistics for the Weights of Hammerstones, Mullers (Including Hammer-Anvil-Mullers), and Millingstones from the Garoga Site

Statistic	Hammerstones	Mullers	Millingstones
Mean	261	620	3,162
Median	241	716	3,504
Standard deviation	159.4	210	1,281
Range	533	510	3,334
Minimum	90	280	1,361
Maximum	623	790	4,695
N	8	8	5

Note: Weights in grams.

Central Onondaga chert heavily predominated in lithic materials used for chipped stone tools. Minor types were Normanskill chert, Knauderack chert, Oriskany chert, and Esopus chert. Four of the six Iroquois knives are of Esopus chert, as are one Madison point, three bifaces in process, and one ovate knife. Presumably the use of Esopus for larger items like knives reflects the need for larger blocks or nodules than were available in the Onondaga formation.

Rough Stone Artifacts

Although the Garoga assemblage includes a variety of functional types of rough stone tools, the inventory is dominated by cobble hammerstones, hammer-anvil-mullers, and millingstones. Summary statistics for the weights of hammerstones, mullers and hammer-anvil-mullers, and millingstones are given in Table 37. A discoidal cobble muller is shown in Figure 59, No. 22, a side-notched netsinker in No. 21, and a net spacer in No. 23.

Materials used for rough stone tools include gabbro, granite, gneiss, slate, sandstone, siltstone, chert, limestone, conglomerate, and quartzite. Sandstone was most popular (25 out of 44 items identified as to material), granite and gneiss were next most popular (7 and 5 items, respectively). Broken down by functional type, it is seen that igneous and metamorphic rocks were most used for hammer-anvil-mullers (4 out of 6 items), hammer-mullers (1 of 2), hammers (2 of 14), and millingstones (2 of 9). Slate, sandstone, and siltstone rather than igneous or metamorphic rocks were used for whetstones.

Ground Stone Artifacts

The majority of celts (Figure 59, No. 25) are of dark gray to black basalt. One is of black porphyry, two fragments are of gray quartzite, and one small celt is of black schist. The shallow-lipped gouge is of quartzite. Two chisels are of basalt, two of slate, two of siltstone (No. 24).

Bone and Antler Artifacts, Shell Artifacts, and European Goods

Table 38 reproduces the trait table for these artifact classes originally presented in Ritchie and Funk (1973:328–329). A number of these items are shown in Figure 59.

Table 38. Garoga Site Bone, Antler, Shell, and European Goods Trait List

Bone	
Awls	
Splinter (mostly deer long bone)	24
Bear long bone	1
Deer metapokial	1
Deer ulna	
Fragmentary	7
Bead, tubular, in process, deer mandible	1
Beads, tubular, in process, deer? bones	3

Beads, tubular, in process, bear metatarsal	1
Beads, tubular, bird bone	6
Bead, from epiphysial cap	1
Cup or spoon, from large mammal epiphysial cap	1
Bead, from elk canine, grooved	1
Deer phalangeal cones, perforated	51
Beaver incisors, ground incisal edge	20
Elk bone tool, perforated shaft	1
Harpoon, single-barbed with line hole	1
Worked bone fragments	5

Antler

Harpoon, single-barbed, with line hole	1
Flaking tools, deer antler	8
Gouge?	1
Worked fragments	4

Shell

Bead, discoidal, centrally perforated	1
Bead, tubular	1

European Goods

Tiny fragment of copper or brass	1

SUBSISTENCE REMAINS

Faunal remains from Garoga were sent to John E. Guilday, of the Carnegie Museum of Pittsburgh, for analysis. The list of species is lengthy, representing a wide range of mammals, birds, reptiles, amphibians, and fish (Ritchie and Funk 1973:329–330). A minimum of 82 individual animals were represented, including 21 species of mammals, 8 of birds, 4 of turtles, 1 snake, 2 amphibians, and 3 fish. Most prominent were white-tailed deer, beaver, dog, and black bear. No other species was represented by more than three individuals. Guilday noted that the incidence of beaver was unusually high. From study of the ages of deer and the presence or absence of antlers on skulls, Guilday postulated a fall-winter hunting emphasis by the inhabitants of the site. A complete list of faunal species from the Garoga site, including NISP and MNI, is presented in Ritchie and Funk (1973:329).

Large amounts of floral remains, preserved by charring, were recovered at Garoga. These included corn, squash, and pumpkin seeds, but no beans were found. Good alluvial bottom lands are not available in the local area, 8 miles north of the Mohawk River, but extensive sandy loams, based on late-glacial deposits, surround the site for several hundred acres. These soils would have been well suited for the shifting cultivation known to have been practiced by the Iroquois. Outside these sandy deposits are extensive areas of gravel and clay loams, less adequate for raising Iroquois cultigens, and more difficult to work with digging sticks and hoes. The residents at Garoga also fished and collected nuts, wild fruits, and shellfish, but the amount of protein provided from these sources was probably relatively small. For a detailed discussion of broad trends in Mohawk faunal assemblages and subsistence patterns, see Kuhn and Funk (2000).

RADIOCARBON DATES

A large charcoal sample from Feature 11, associated with typical potsherds of the Garoga phase, was submitted in November 1963 to the Yale University Radiocarbon Laboratory. The resulting determination of 620 B.P. +/- 100 years, or ca. A.D. 1330 (Y-1381) was regarded by Ritchie and Funk (1973:330) as much too old for the age of the occupation as estimated from the relatively late ceramics. Subsequently, Snow (1995:164) submitted several samples to the accelerator mass spectroscopic (AMS) laboratory at the University of Arizona for analysis. All of the dates so far available are listed in Table 39.

Table 39. Radiocarbon Dates for the Garoga Site

Lab Number	Material	Date (yr B.P.)	Calibration[a]
Y-1381	Charred wood	620 +/- 100	1280 (1315, 1369, 1386) 1420
AA-6417	Zea mays	300 +/- 50	1494 (1532, 1541, 1637) 1650
AA-7403	Zea mays	410 +/- 60	1431 (1446) 1610
AA-7695	Zea mays	431 +/- 49	1428 (1441) 1479
AA-8370	Zea mays	585 +/- 40	1304 (1329, 1348, 1392) 1409

[a] 1 sigma (mean [s]) 1 sigma

The only date that approximates the commonly accepted occupation period for Garoga is the A.D. 1541 mean from sample AA-6417. At least two longhouses at Garoga clearly predate the construction of the heavy palisade. So, technically, Garoga must be considered a multicomponent site. A detailed comparison of the ceramics from pits in these two houses with the ceramics from the primary village area has not been completed. Therefore the relative age of this earlier component and its possible association with any of the radiocarbon dates for the site cannot be determined at this time.

REVISED SETTLEMENT PATTERN INTERPRETATIONS

Reanalysis of the Garoga site data requires some revisions of the settlement pattern model presented in Ritchie and Funk (1973:Figure 30). This became evident with completion in 1999 of the very detailed small-scale maps traced directly from field notes produced in the 1960, 1961, 1962, and 1964 field seasons. Maps prepared for the 1973 report were not as complete and detailed as the new maps. The 9-house pattern proposed earlier now appears too simplistic and conservative. As many as 13 houses and possibly 1 or 2 more once existed on the site (Figure 43). Although some aspects of the number, size, interior structure, and arrangement of longhouses remain in question because the landowner had requested that several large clumps of pine trees remain untouched, there is no doubt that the new interpretations more closely match prehistoric reality.

Originally Funk believed there were nine houses, arranged in three clusters of three, that took advantage of the shape of the hilltop. He had not fully considered the evidence for a tenth house on the south side of the eastern cluster or the conflicting data for the exact length and orientation of House 8. Possible house walls intersecting the stockade were mentioned, as was the possibility of a short house in the unexcavated area north of House 4. It now appears that evidence for houses intersecting the stockade, and perhaps others west of those, was indicated by Harrington's (1905) map of excavated storage pits, some occurring in rows, but not noted in Funk's original analysis.

There is little question that some houses were built on site before construction of the stockade. It is unclear whether houses existed at that time in the large area east of the stockade. Conceivably all 13 of the postulated houses predated the stockade, but for some reason Houses 12 and 13 were abandoned and razed to make space for the defenses. This notion implies that at least a temporary reduction in village population may have taken place. It is also possible that Houses 12 and 13 represent a separate and older component preceding the main occupation. However, there is no conclusive evidence for such a component.

The arrangement of houses at Garoga suggests that the village within (east of) the stockade was planned as a unit. If this is so, the location was doubtless chosen in advance by the leaders of the community, preparing to move from a village located elsewhere in the region. As is well known, Iroquois communities customarily shifted their locations every 10 to 20 years as a consequence of factors such as soil depletion or exhaustion of firewood. Suggested predecessor sites for Garoga include Wormuth (Lenig 1977:72) or the Otstungo site (Bamann 1993:234). The little-known Cooper site, a late-Chance–early- Garoga-phase site located just 2.5 miles east of Garoga, would be another possible candidate.

As noted previously, storage pits and house walls occasionally intersected. The temporal order of pits and walls only occasionally could be determined, but a logical explanation can be offered for the observed distribution. The village was probably constructed in stages before attaining its final form, albeit over a relatively short period of time. Even if the total period amounted to just two or three seasons, one can visualize an initial stage during which perhaps 2 or 3 houses were erected and occupied at one time, followed by the building of other houses, until all 10 or 11 stood on the site together. During the early stages, storage pits were probably dug both inside and outside the houses. As later houses were constructed in formerly open spaces, their walls would have run across some of the exterior pits originally associated with earlier houses.

CHAPTER 5

DISCUSSION AND CONCLUSIONS

This monograph has presented the final report on archaeological investigations at three major Mohawk Iroquois village sites located in the Caroga Creek drainage of the middle Mohawk Valley. Known as the Garoga, Klock, and Smith-Pagerie sites, they were all excavated between 1960 and 1970 by crews from the New York State Museum, Harpur College (now the University at Binghamton, SUNY) and the University at Albany, SUNY. The fieldwork was under the direction of Robert Funk as one aspect of the settlement pattern project instigated by William A. Ritchie.

Although a complete report on Garoga appeared in Ritchie and Funk (1973:313–332), only brief, partial reports on the Klock and Smith-Pagerie sites were published. This monograph presents a large body of new data never before published, as well as new interpretations of settlement pattern at all three sites. The quality and quantity of settlement pattern information from Garoga, Klock, and Smith-Pagerie is unmatched on village sites elsewhere in the Mohawk Valley, but Snow and his team have also recovered important settlement pattern data from other sites in the drainage (Snow 1995). Unusually large areas were opened at Klock, Smith-Pagerie, and Garoga, and despite the inevitable uncertainties and ambiguities, reasonably accurate estimates are available for the number and placement of the longhouses on the sites. Also unmatched are the substantial quantities of data on the size and internal structure of houses, the relatively large numbers of excavated features, and the very considerable volume of recovered artifacts and subsistence remains. It should also be noted that Ritchie acquired considerable data on Chance-horizon settlement patterns at the Getman site in the Mohawk Valley (Ritchie and Funk 1973:276–312).

Principal changes in the (previously unpublished) map of Klock include revised, shorter lengths of Houses 1, 3, and 5 (Figures 5, 8, 9). At Smith-Pagerie, the map of which also was not previously published, the chief modifications were in specific lengths of some houses and the configuration of ends (Figure 26). More extreme were the modifications to the map of Garoga originally proposed by Ritchie and Funk (1973:Figure 30). Instead of 9 houses arranged in three clumps of three, it now appears likely that there were at least 11 houses within the area bounded by the double stockade, and 2 more overlapping (and preceding) the stockade (Figure 43).

TERMINOLOGY

W. Lenig (2000) has provided a thorough history of the development of terms and concepts in eastern Iroquois archaeological research, including a review of the various periodizations, phases, horizons, and archaeological cultures proposed by MacNeish, Ritchie, D. Lenig, Tuck and others. Consequently little of this needs repeating here. These various schemes, and constructs such as the "Oak Hill horizon," "Chance phase," or "Garoga phase," served an important purpose in their day, when the basic chronology and cultural development of the eastern Iroquois was still being worked out. Now that there is general agreement that continuous in situ cultural development characterized Mohawk society during the period A.D. 1300 to A.D. 1700, these constructs seem less important. To borrow a phrase from Ritchie and Funk (1973:167), they represent "an arbitrary slice of a developmental continuum." As such, they can be problematic. Defining the boundaries between phases is difficult, too much emphasis is placed on terminology and semantics, and differentiation is emphasized at the expense of continuity. Lenig (2000:68–69) reaches similar conclusions. Consequently we have largely attempted to avoid the use of much of this nomenclature in our work.

However, we do feel compelled to comment on some terminological issues relevant to the Garoga, Klock, Smith-Pagerie period of occupation in the Mohawk Valley.

The Garoga site was the type site for the Garoga phase (Ritchie 1980:317–324) and the Klock and Smith-Pagerie sites, although recognized as protohistoric, have always been considered Garoga-phase occupations (Ritchie and Funk 1973:327, 331). Ritchie and Funk (1973:169–170) stated "The Garoga phase, as the culmination of eastern Iroquois cultural evolution, survived into the contact period, remaining intact for a very few decades prior to the full impact of acculturation with European civilization." A list of ceramic, lithic, and other traits constituted the definition of the phase, but it was clearly recognized to be just one brief stage in a long continuum of Mohawk cultural development.

In his major monograph on the University at Albany's Mohawk Valley Project, Snow (1995:85) retains the term "Chance phase" for sites dating from A.D. 1400 to 1525 and suggests that Ritchie's "Garoga phase" of ca. 1525 to 1580 has been "squeezed out" by recent research in the Mohawk Valley. Snow feels Ritchie intended to define a final prehistoric phase just preceding the advent of contact with Europeans, but because the first evidence of contact appears shortly after 1525, there is no longer any validity to the Garoga phase. But we assert that the concept of the Garoga phase was initially defined based on a constellation of numerous archaeological attributes, not necessarily linked to the presence or absence of European goods. The first trade goods on Mohawk sites represent evidence of *indirect* contact with Europeans. Trade objects of metal found in situ at Garoga, Klock, and Smith-Pagerie are very meager indeed. Evidence is lacking for any substantial impact of European culture traits, such as architecture, agricultural practices, religion, and technology. The *protohistoric* status of the sites does not invalidate the traits that define the Garoga phase, and one could also argue that the phase essentially ended with the first known European accounts of visits to the Mohawk country in the early seventeenth century, including the journey of van den Bogaert (Gehring and Starna 1988). We might add that a clue to Ritchie's actual thinking is to be found in his well-known synthesis (Ritchie 1980:317), where he clearly regards Van den Bogaert's account as a description of Garoga-phase settlements.

But there is a further consideration. The terms *Oak Hill* and *Chance* were defined by Donald Lenig (1965) as *ceramic horizons*, not phases, and this was emphasized by Donald Lenig in conversations with Funk (see also W. Lenig 2000:60–64). Although Ritchie, Funk, Tuck, and others have used these terms as phases in past publications, the present authors are convinced that their only true validity is as ceramic horizons or, even more specifically, as pottery traditions. For example, major changes in Mohawk subsistence patterns, which are perhaps a better indicator of sociocultural development, do not always correlate with trends in Mohawk pottery (Kuhn and Funk 2000). This clearly demonstrates that ceramic horizons should not be equated with cultural or archaeological phases. It now seems to us that the term *Garoga* is better considered simply as a ceramic horizon, or pottery tradition, in the same sense as the Oak Hill and Chance horizons.

Ritchie viewed the Oak Hill, Chance, and Garoga phases as valid not just for the Mohawk but also for the other eastern Iroquois tribal areas, specifically the Oneida and Onondaga. Phase designations aside, the correlation of material culture, pottery traditions, and cultural development across eastern Iroquoia is an important research focus that needs to be addressed, but we will not go into further detail on this aspect of his scheme.

Another problem, as pointed out to us by Wayne Lenig (personal communications 2002), concerns how to define the temporal boundaries of the Garoga *horizon*. Garoga Incised-type pottery is most popular on sixteenth-century Mohawk sites, where it frequently constitutes more than 80 percent of the pottery assemblage and is a key trait in the constellation of artifacts typically used to define the Garoga phase. But the type also occurs on early-fifteenth-century Mohawk sites and is the dominant type on late-fifteenth-century sites that are typically considered so-called "late-Chance-phase" occupations. In addition, the Garoga Incised type often continues to be the dominant pottery type in seventeenth-century Mohawk ceramic assemblages, although other new types significantly increase in their popularity. Perhaps the Garoga horizon can be said to end when the combined frequencies of the so-called historic types (Cromwell Incised, Martin Horizontal, Thurston Horizontal, Wagner Incised) are higher than the frequency of the Garoga Incised type. This transition appears to have occurred during the second quarter of the seventeenth century. On the other hand, it could be argued that the Garoga pottery tradition only ended with the phasing out of native pottery itself, in favor of kettles of European manufacture. This occurred gradually over the course of the second half of the seventeenth century. Perhaps it need not be restated, but a pottery tradition that was dominant at least from A.D. 1475 to A.D. 1625, and persisted across periods of major change in Mohawk subsistence, settlement pattern, demography, material culture, warfare, and European contact, is a poor basis for the postulation of an archaeological phase or discrete cultural manifestation.

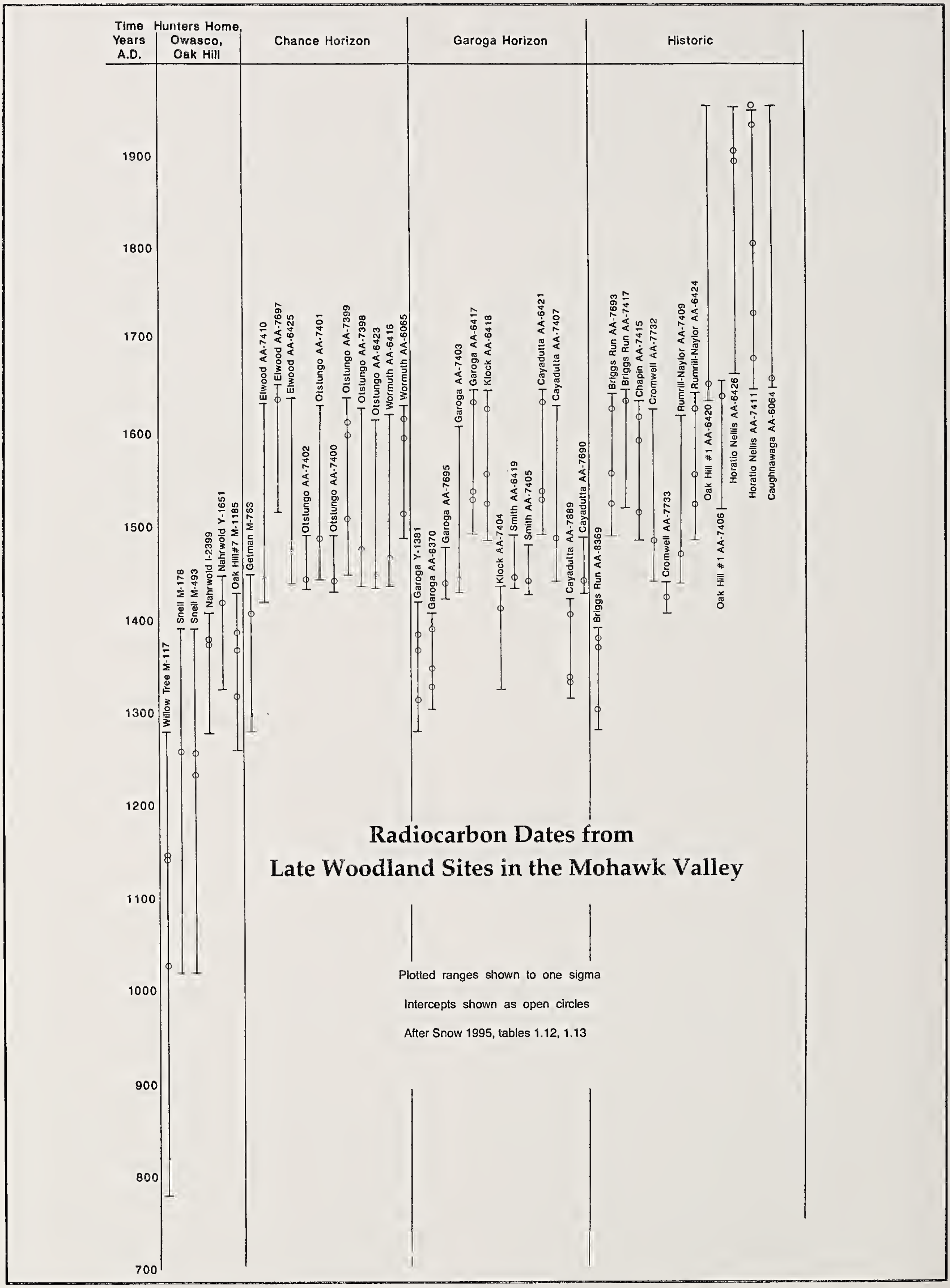
CHRONOLOGICAL CONSIDERATIONS

Of particular interest is the dating and chronological order of the three sites that are the focus of this study. It is generally agreed that the Garoga, Klock, and Smith-Pagerie sites all date to the sixteenth century (Lenig 1977:72; Ritchie and Funk 1973:327; Snow 1995). All three have produced isolated examples of European trade goods, which occur in Iroquoia no earlier than approximately A.D. 1525 (Bradley 1987:48, 69; Snow 1995:143). None has the amount of European artifacts found on late-sixteenth-century and early-seventeenth-century sites. The former always have more than just isolated examples; on the latter, trade goods usually constitute about 10 to 15 percent of the assemblage (Bradley 1987:74, 130; Lenig 1977:78; Rumrill 1991:7; Snow 1995:197). Therefore, using the overall frequency of European trade goods as a guide, and working backwards from documented historic Mohawk sites using the Direct Historic Approach (MacNeish 1952:1; Steward 1942), it is clear that all three sites date to the sixteenth century. Further, all three components probably fit into a time period no earlier than ca. 1520 to 1525 and no later than ca. 1585 to 1590. However, it is not possible to define the correct chronological order of the sites or provide more precise calendric dating of the sites based upon the frequency of European trade goods.

Snow (1995:Tables 1.12, 1.13) has obtained large numbers of radiocarbon dates for Mohawk sites in order to refine the calendrical sequence. This admirable effort has added significant new information to our knowledge of the existing site chronology. Unfortunately the results clearly indicate that radiocarbon dating lacks the precision necessary to refine the dating of sites as close in time as Garoga, Klock, and Smith-Pagerie. The dates do not permit the chronological separation of occupations ranging from the mid-fifteenth century to the early seventeenth century. There is nearly complete concordance and overlap of the whole series except for the earliest group of Hunters Home, Owasco, and Oak Hill sites and the latest group of seventeenth-century sites (see Figure 61). This is undoubtedly because the period under consideration here, about 200 years (A.D. 1450–1650), was relatively brief, and the dating method lacks sufficient sensitivity effectively to discriminate among the various components. W. Lenig's (2000:68–69) discussion of radiocarbon dating for eastern Iroquois chronology building reaches similar conclusions. The wide spread of dates for certain sites (e.g., Garoga, Klock, and Cayadutta) could also reflect the presence of organic materials from components other than those considered the major occupations of those sites. For various reasons, we consider this unlikely and are inclined to question the precision or reliability of some dates.

It seems clear that an analysis of temporal trends in pottery may be the best, and perhaps the only, method that can provide a strong basis for ordering the Garoga, Klock, and Smith-Pagerie sites in time. Attributes of collar shape and decorative style changed gradually over time in the native Mohawk tradition of pottery manufacture. After these trends are identified, they can be used to organize the sites relative to one another chronologically. Because the popularity of certain styles and forms can change over the course of just a few decades, the method can detect chronological relationships among sites in a way that is not possible with radiocarbon dating. Furthermore, because the approach uses native material-culture traditions, it is superior to relying on the frequency and types of European trade goods to order sites, because these can easily be affected by factors such as changing patterns of trade, access, and disposal.

The junior author has been building a database of pottery attributes for Mohawk sites as part of a larger study of Mohawk ceramics (Kuhn and Bamann 1987; Kuhn 1994). For the present study, comparisons of attribute data from Garoga, Klock, and Smith-Pagerie were made using one earlier site (Elwood) and one later site (Wagner's Hollow) to help define temporally sensitive attributes and anchor the beginning and end of the sequence. Elwood is a late-fifteenth-century site that lacks European trade goods. It clearly precedes Garoga, Klock, and Smith-Pagerie. The Elwood village subsequently moved to the Otstungo site, which some have argued is a predecessor to the Garoga–Klock–Smith-Pagerie community (Bamann 1993:234). At the other end of the sequence, Wagner's Hollow is an early-seventeenth-century site located in the Caroga



Radiocarbon Dates from
Late Woodland Sites in the Mohawk Valley

Plotted ranges shown to one sigma

Intercepts shown as open circles

After Snow 1995, tables 1.12, 1.13

Figure 61. Graph of plotted radiocarbon dates for Mohawk sites, shown to 1 sigma.

Table 40. Pottery Collections

Site	Collections	*N*	Recorder
Elwood	University at Albany, SUNY	89	Kuhn
Garoga	New York State Museum	546	Kuhn
	Frey & Richmond Collection	21	Bamann
Klock	New York State Museum	422	Kuhn & Bamann
Smith-Pagerie	New York State Museum	152	Engelbrecht
	John Swart Collection	285	Engelbrecht
	Both	8	Engelbrecht
Wagner's Hollow	D. Lenig Collection	165	Engelbrecht
	Cooperstown Indian Museum	8	Engelbrecht
	T Whitney Collection	1	Engelbrecht

Creek drainage. European trade goods make up 10 percent of the artifact assemblage from the site (Lenig 1977:78). The Garoga–Klock–Smith-Pagerie community probably relocated directly to Wagner's Hollow (Lenig 1977:72) or more likely moved there after an intermediate occupation at the late-sixteenth-century Kilts site (Snow 1995:232).

This study uses the attribute list for Iroquois ceramics developed by Engelbrecht (1971:116–125). A number of different collections from these sites were employed, and the attribute data was recorded by different individuals, sometimes working together and sometimes independently. Information on the collections, sample sizes, and recorders is presented in Table 40.

There are two basic classes of Mohawk pottery vessels based upon the treatment of the top of the pot: collared vessels and collarless vessels. On the former, a distinctive collar with a well-defined base forms the top of the pot. On the latter, the top or rim of the vessel is a simple thickened lip. Decoration is common on both vessel forms. Collared vessels are always the dominant type on Mohawk sites, usually comprising 70 percent or more of the assemblage (Table 41). The attribute analysis presented here is limited to an examination of the collared vessels in these assemblages, because a number of important attribute categories do not occur on collarless pottery.

Table 41. Vessel Types

Site	Collared	Collarless	Total
Elwood	71	18	89
Garoga	539	28	567
Klock	311	111	422
Smith-Pagerie	389	56	445
Wagner's Hollow	147	27	174

Ten attributes were selected for use in this study, 5 representative of collar form or shape and 5 representative of decorative elements (Table 42). These 10 attributes have been selected for two reasons. First, collectively they provide a good overall description of a pot's collar shape and design. Second, they are temporally sensitive attributes that change over time and can be used to help chronologically order Mohawk sites.

Table 42. Pottery Attributes Used in the Analysis

Form (shape)	Decoration
∗ Castellations	• Lip surface decoration
∗ Lip shape	∗ Horizontal border lines
+ Exterior rim contour	• Central motif
• Collar-neck relationship	• Motif complexity
∗ Collar height	∗ Collar base treatment

Note: Symbols are keys to site orderings discussed in the text.

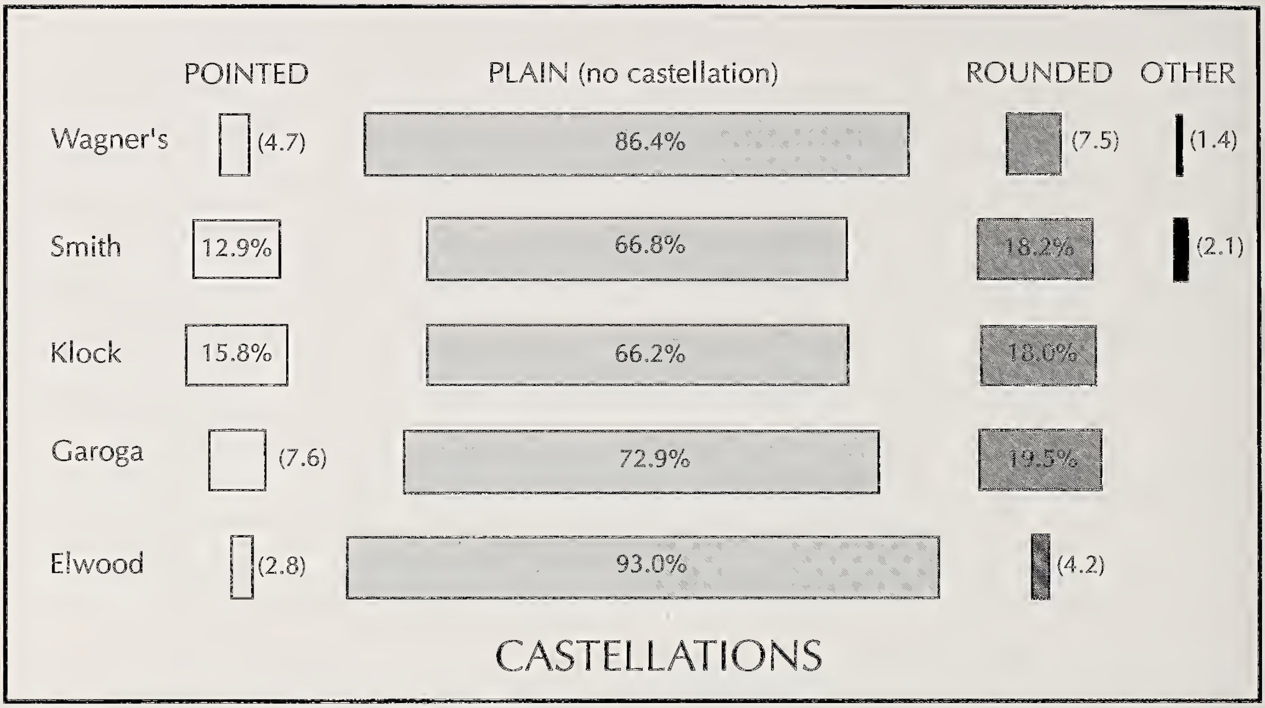


Figure 62. Seration of Mohawk sites: Castellations.

For each attribute the frequencies (percentages) of different attribute states were calculated for each site assemblage. Using the techniques of traditional seriation, a relative site chronology was developed by visually ordering the sites in patterns that demonstrate gradual change over time. The results for each attribute are presented in Figures 62 to 71.

The attribute categories presented in these figures should be largely self-explanatory to those familiar with Iroquois pottery. A comprehensive description of each attribute will not be presented here. The reader needing attribute descriptions or a greater

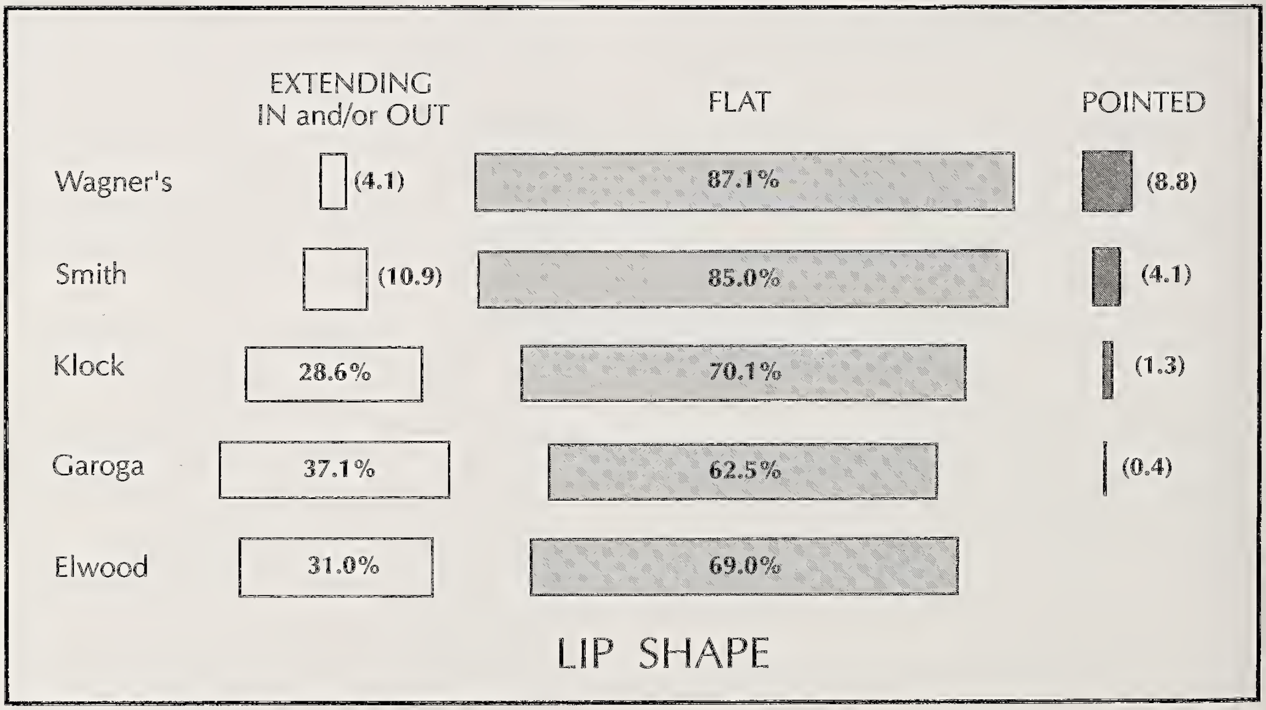


Figure 63. Seration of Mohawk sites: Lip Shape.

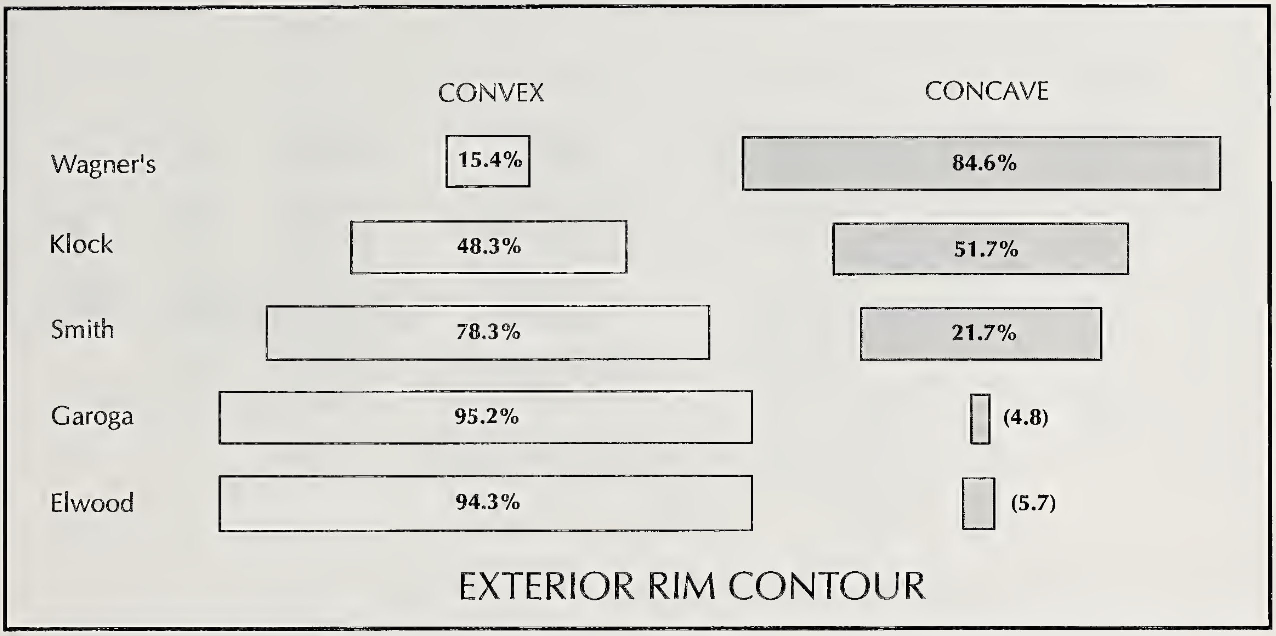


Figure 64. Seration of Mohawk sites: Exterior Rim Contour.

understanding of Iroquoian pottery is referred to the many reference works on this subject for further information (Engelbrecht 1971; Lenig 1965; MacNeish 1952; Ramsden 1977; Ritchie 1952).

Some special notations are in order relative to specific aspects of these attributes. The category "horizontal border lines" (Figure 68) is an esoteric attribute that refers to the number of horizontal lines bordering the top of the central collar motif on Mohawk pottery. See Kuhn and Bamann (1987:44–45) for a more complete description. The results presented here differ slightly from those presented in Kuhn and Bamann, because we chose to exclude exotic pottery types when calculating this statistic for the present study.

The four defined categories for the "central motif" (Figure 69) include motives that display only those attributes. Pottery with combinations of these attrib-

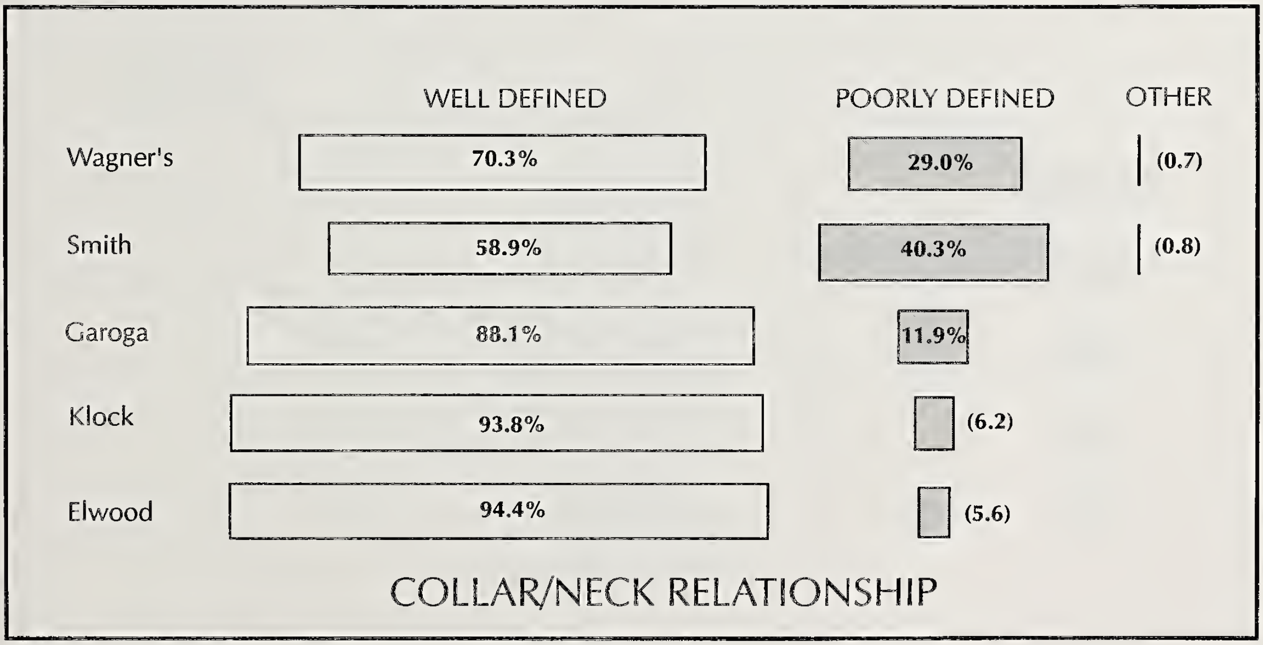


Figure 65. Seration of Mohawk sites: Collar-Neck Relationship.

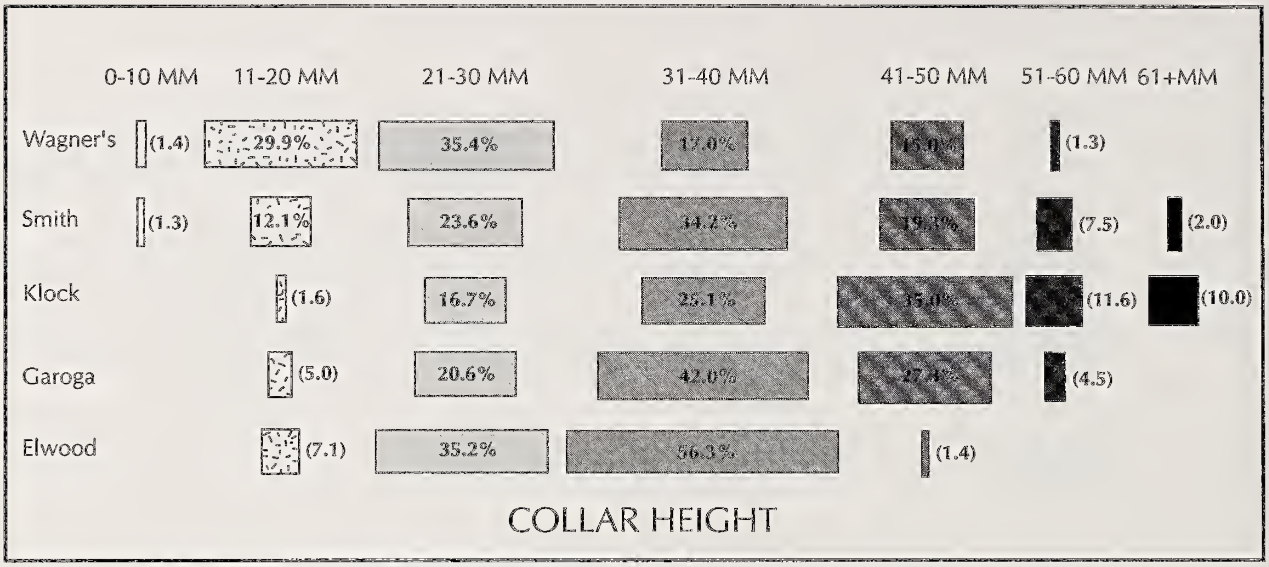


Figure 66. Seration of Mohawk sites: Collar Height.

utes, such as a vessel with both horizontal and vertical lines in the central motif, is included in the "other" category.

"Motif complexity" (Figure 70) refers to the number of design elements, from top to bottom, that comprise the collar motif. See Kuhn (1994) for a more complete description of this attribute, as well as a number of other attributes included in this study. The results presented here differ slightly from those presented in Kuhn (1994:34), because we chose to include undecorated collars when calculating this statistic for the present study.

Most other researchers have chosen to classify "collar height" into high and low, or high, medium, and low categories. Lines dividing these categories are too arbitrary. For this study, collar heights were measured to the nearest millimeter and then grouped into 10-millimeter units (Figure 66). This

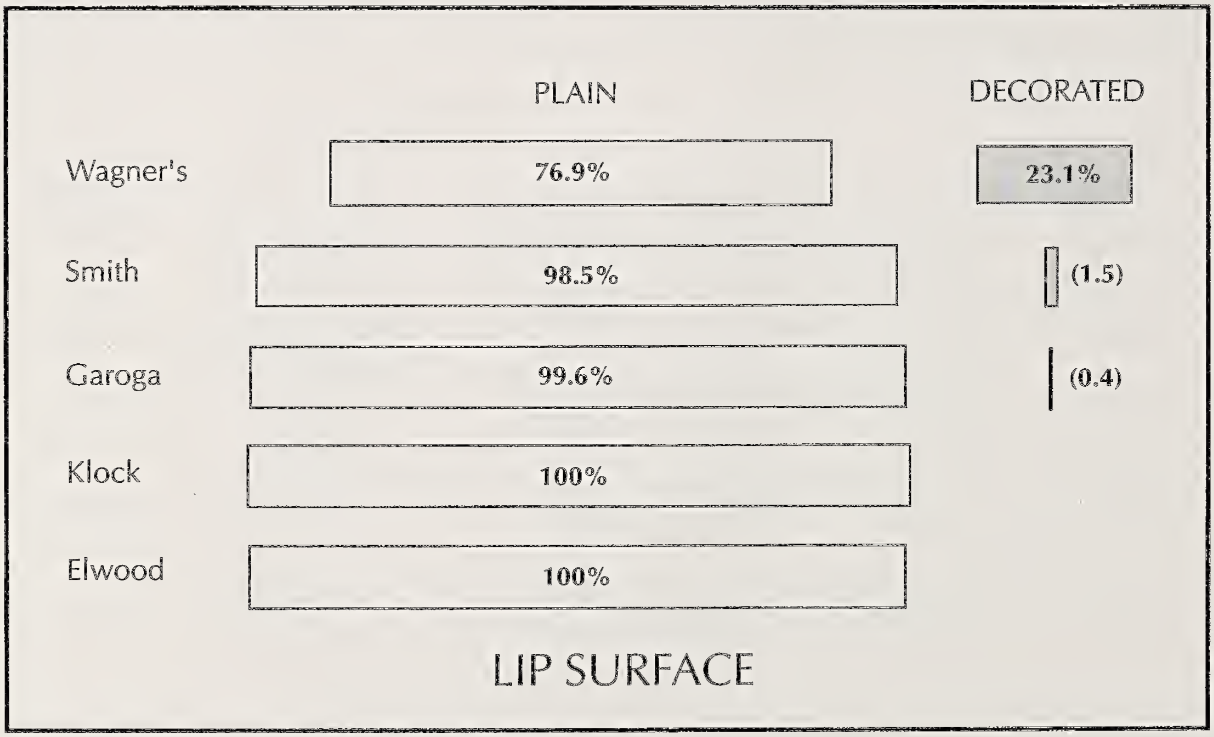


Figure 67. Seration of Mohawk sites: Lip Surface.

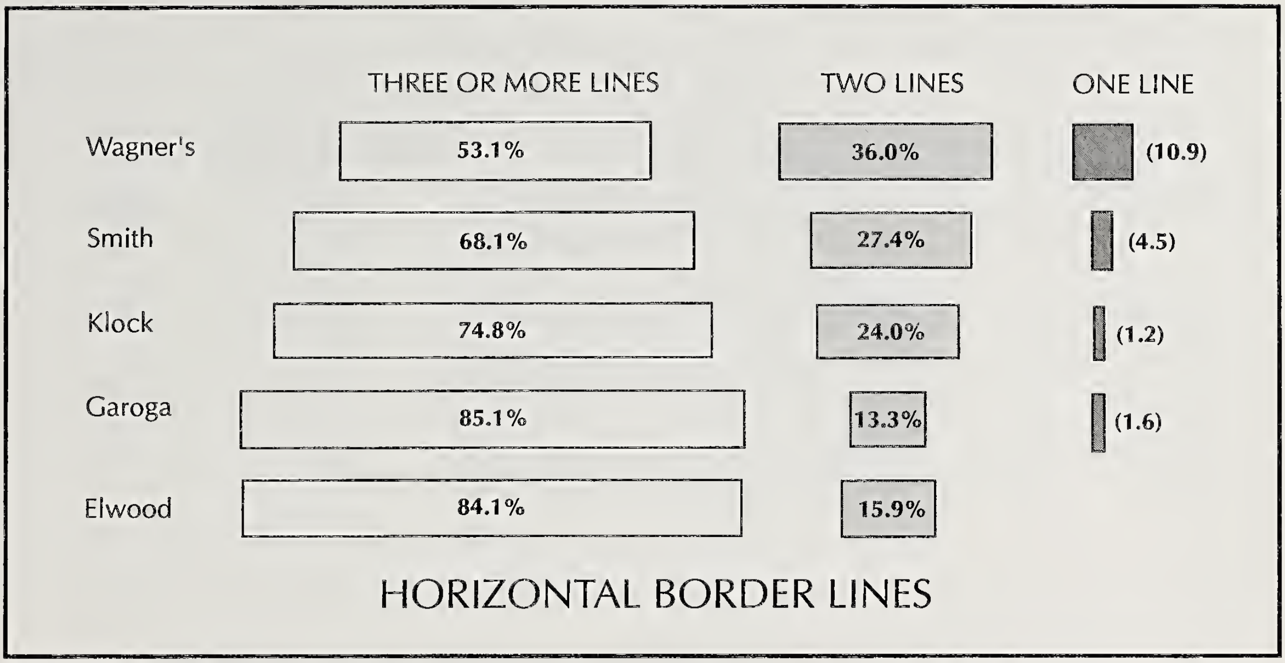


Figure 68. Seration of Mohawk sites: Horizontal Border Lines.

provides a much greater sense of the collar height distributions and is less dependent on one or two key, but arbitrary, cut points. Furthermore, it allows for a quantitative calculation of the mean collar height for each assemblage (presented below), which has proven to be an extremely robust chronological indicator for Mohawk sites.

"Exterior rim contour" (Figure 64) is an important attribute, because it has been shown by other studies to be chronologically sensitive. Bradley's (1987:31, 38–39) study of Onondaga ceramics demonstrated that convex and straight rim profiles give way to concave rim profiles over the course of the sixteenth century. This pattern characterizes pottery trends for eastern Iroquois tribes in general. But our analysis of the percentages of convex, straight, and concave profiles was unable to produce any site ordering in which this gradual change over time was demonstrable. This is probably because the convex, straight, and concave attributes grade into one another and

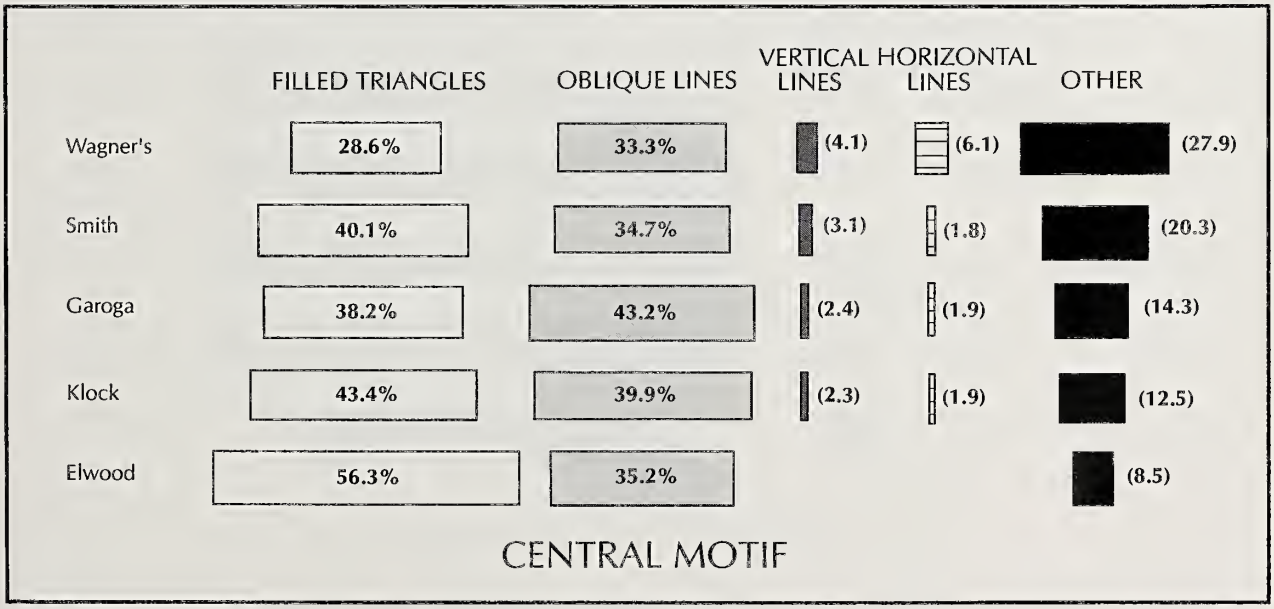


Figure 69. Seration of Mohawk sites: Central Design Motif.

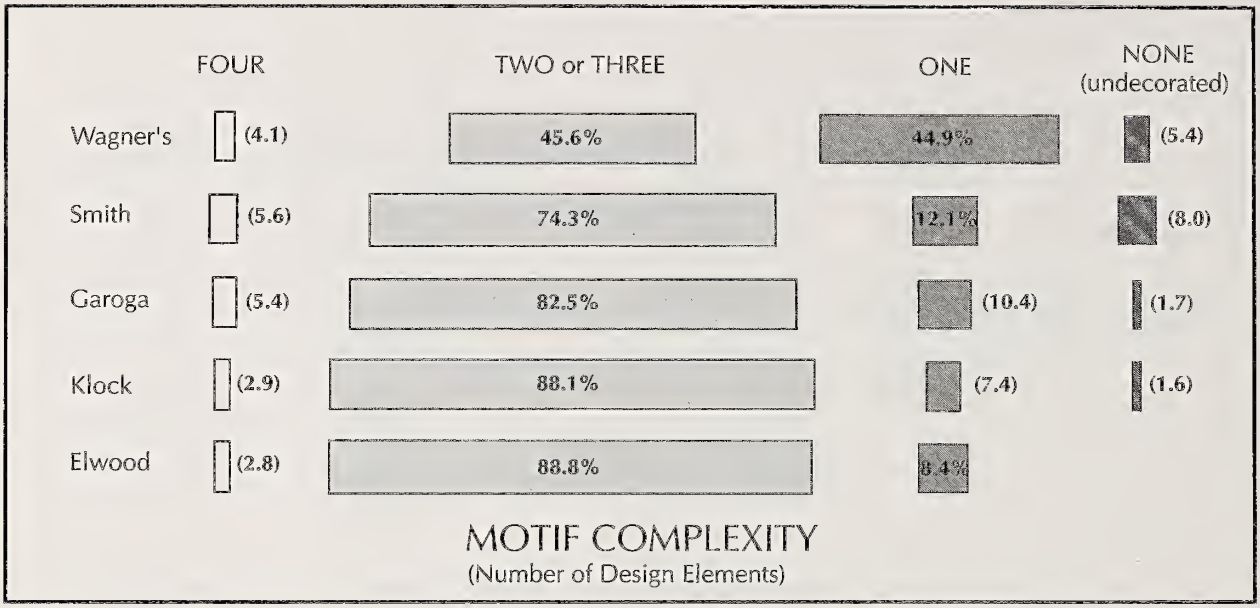


Figure 70. Seration of Mohawk sites: Motif Complexity.

are an arbitrary categorization of the broad range and variability in rim profiles (consider, e.g., MacNeish 1952:93). The fact that the Mohawk assemblages were examined by different recorders may have compounded this problem if different people recorded the gradations in this attribute differently. Our solution is to delete straight profiles from the analysis and compare only collars that are clearly convex with those that are clearly concave. This is the only approach that results in any site order that fits the pattern of gradual change over time.

Unfortunately, but perhaps not surprisingly, the 10 attributes do not all place the five sites in the same chronological order. The principal reason for this is probably a problem related to archaeological sampling. The ceramic assemblages studied here represent only a small sample of the pots produced at these sites. So sampling vagaries are possible. The Garoga, Klock, and Smith-Pagerie sites are very close in time and space and their ceramic assemblages are very similar. For many of the attributes, the pottery assemblages differ by only a few percentage points.

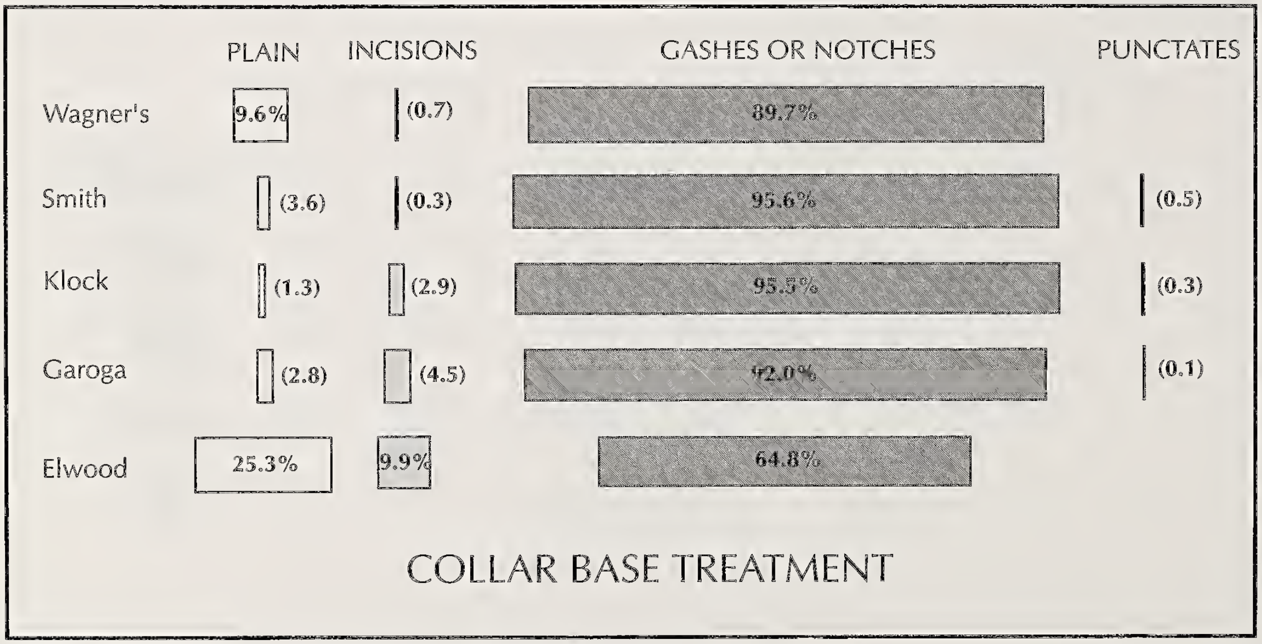


Figure 71. Seration of Mohawk sites: Collar Base Treatment.

Even slight changes in the percentages can lead to different orderings of the sites. Given the significant problems with archaeological sampling, it is not surprising that even a fine-grained analysis will not produce perfect results. This is especially true when we consider that different attributes may have changed at different chronological rates, that differences in the frequencies of some attributes may be reflecting variables other than time, that cultural factors can sometimes invalidate the assumption that stylistic change will always occur gradually over time, and the likelihood that the native Mohawk pottery tradition was affected by varying levels of external influence over the period under study here. With all these factors in play, perfectly consistent results across all the attributes cannot be expected.

Three site orders appear in the attribute trends. We have keyed each attribute to its corresponding order in Table 42:

∗ Elwood, Garoga, Klock, Smith-Pagerie, Wagner's Hollow

• Elwood, Klock, Garoga, Smith-Pagerie, Wagner's Hollow

+ Elwood, Garoga, Smith-Pagerie, Klock, Wagner's Hollow

Using this key, one can see that 5 out of the 10 attributes produce the first order, 4 out of 10 attributes produce the second order, and 1 attribute produces the third order. Yet, despite this inconsistency, some clear conclusions regarding the chronological relationships of the sites can be made. For example, the Garoga site is placed in a chronological position preceding the Smith-Pagerie site in all 10 attributes. Also the Klock site is placed in a chronological position preceding the Smith-Pagerie site in 9 out of the 10 attributes. Therefore it can be concluded with a fair degree of assurity that the Smith-Pagerie site is the latest of the three sites in the Garoga, Klock, Smith-Pagerie sequence.

The chronological relationship of the Garoga and Klock sites is more equivocal. Garoga precedes Klock in six of the attributes, but Klock precedes Garoga in the other four. One would have to lean toward Garoga being the earlier of the two sites, but these results alone are clearly not conclusive.

Earlier it was mentioned that the quantitative statistic of mean collar height was a strong chronological indicator. Bradley (1987:38, 54–55) has noted for the Onondaga that collar heights increased during the early 1500s and then declined toward the end of that century. A similar pattern is clearly apparent in Mohawk ceramics. In fact, the junior author's more comprehensive and as yet unpublished analyses of ceramic attributes indicate that mean collar height is one of the best chronological indicators for all Mohawk sites. Consider Table 43.

Mean collar heights increase from an average of 30 millimeters at the Elwood site to a peak of more than 40 millimeters at the Klock site, then they gradually decline, ultimately falling below 30 millimeters at the Wagner's Hollow site. The smoothest trend in this statistic is created by the order: Elwood, Garoga, Klock, Smith-Pagerie, Wagner's Hollow. This would appear to add considerable evidence in support of placing the Klock site in an intermediate position between the Garoga and Smith-Pagerie sites.

Yet it could be argued that putting the Klock site before the Garoga site does not produce an entirely unacceptable pattern. The trend is not quite as smooth, but the increasing-decreasing pattern remains. Perhaps peak collar heights were simply achieved slightly earlier in time. This argument falls apart when the coefficient of variation is considered.

Table 43. Quantitative Statistics for Collar Heights

Site	*N*	Mean	Standard Deviation	Minimum Maximum	Coefficient of Variation
Wagner's Hollow	147	27.56	10.85	8–57	39.4
Smith-Pagerie	389	35.14	12.29	8–74	35.0
Klock	311	42.50	12.49	15–81	29.4
Garoga	539	36.04	9.41	8–78	26.1
Elwood	71	30.35	5.85	16–41	19.3

Note: Measurements in millimeters.

Bradley (1987:55) has noted that there is a pattern of increasing variability in Onondaga ceramics over time. The same is true for Mohawk ceramics. The coefficient of variation is a way to measure this variability for the collar height attribute. The coefficient of variation is a percentage, based on the mean and standard deviation, which serves as a measure for comparing the relative degree of variation in different samples. The increasing value of the statistic demonstrates that there is a consistent pattern of greater variability in the distribution of collar heights within ceramic assemblages over time. This increasing value orders the sites: Elwood, Garoga, Klock, Smith-Pagerie, Wagner's Hollow. Moving the Klock site to a position preceding the Garoga site clearly disrupts the pattern.

In addition to examining each of the 10 qualitative attributes individually, there are also methods available for assessing the attributes collectively. One of the most popular in archaeological research is the use of the Brainerd-Robinson coefficient of agreement (Brainerd 1951). This coefficient measures the similarity of sites to one another across all attributes. The higher the coefficient, the more similar a pair of sites is to each other. Brainerd-Robinson coefficients of agreement were calculated using the 10 qualitative attributes presented in Figures 62 to 71, and the results are presented in Table 44.

Table 44. Brainerd-Robinson Coefficients of Agreement

Site	Elwood	Garoga	Klock	Smith	Wagner's
Elwood	200	176	165	159	140
Garoga		200	179	175	145
Klock			200	171	150
Smith				200	160
Wagner's					200

When employing the Brainerd-Robinson coefficient of agreement for ordering sites chronologically, perfect results would consist of a pattern in which the coefficient consistently declines as you read across all rows from left to right, and consistently increases reading down all columns from top to bottom. For many of the same reasons discussed above regarding sampling, this type of perfect result rarely, if ever, occurs in archaeological research. Considering this, the results produced here are remarkable. When the sites are put in the order of Elwood, Garoga, Klock, Smith-Pagerie, Wagner's Hollow, the expected pattern does result except for one aberrant cell in the Smith-Pagerie column. Here the Smith-Pagerie site is more similar to Garoga than it is to Klock, which is inconsistent with the remainder of the table. But the difference (175, 171) is minimal. What the core of the coefficients table really demonstrates is that the three sites—Garoga, Klock, Smith-Pagerie—are all very similar to one another (179, 175, 171).

For chronological interpretation, we prefer to put the heaviest reliance on the patterns demonstrated in Table 44 by the two anchor sites, Elwood and Wagner's Hollow. These sites are firmly dated at the beginning and end of this five-site sequence, and their relationship to the other sites, as demonstrated by the Brainerd-Robinson coefficient, is consistent and unequivocal. Elwood is most similar to Garoga, followed by Klock, then Smith-Pagerie, and finally Wagner's Hollow. Wagner's Hollow is most similar to Smith-Pagerie, then Klock, then Garoga, and finally Elwood. They both confirm that the correct chronology of the three principal sites under consideration here is Garoga, Klock, and Smith-Pagerie in that order.

It is important to note that the use of the Brainerd-Robinson coefficient for chronologically ordering sites can be problematic, because the statistic cannot take into account the fact that increases and decreases in the popularity of certain attributes over time can produce similarities in assemblages from sites that are chronologically far apart. The statistic also significantly underweights the importance of presence/absence data. Consider, for example, the attribute *castellations* in Figure 62. Seriating the sites visually, we place Elwood at the beginning and Wagner's Hollow at the end of the sequence, thereby creating the classic battleship-curve patterns for the "pointed" and "rounded" categories. The presence/absence of "other" types of castellations is another clue that is useful to confirm that Elwood belongs at the beginning, and Wagner's Hollow belongs at the end, next to Smith-Pagerie. But when the Brainerd-Robinson coefficient is calculated for the attribute castellations, the Elwood and Wagner's Hollow sites are shown to be the second-most similar assemblages (after only Klock–Smith-Pagerie). This is because they both have high frequencies of uncastellated wares and low frequencies of pointed and rounded castellations, relative to the other three sites. In addition, the presence/absence of "other" types of castellations translates into such minor frequency differences that it has little impact on the coefficient. Relying on the Brainerd-Robinson coefficient alone would lead to the conclusion that the Elwood and Wagner's Hollow sites are close in time, when they are not.

Similarly, the attribute *collar height* (Figure 66) produces the highest coefficient of similarity for Garoga–Smith-Pagerie, even though the smoothest curve is achieved by placing the Klock site between the two. This factor is responsible for skewing the results in Table 44, which creates a confusing picture of the relationships among Garoga–Klock–Smith-Pagerie and a picture that is inconsistent with the rest of the table. Removing the attribute *collar height* from the analysis and calculating the Brainerd-Robinson coefficient on only the other nine attributes produces a table of coefficients that perfectly orders the sites with no aberrant cells. But such a deletion appears arbitrary and capricious, especially because collar height is one of the most temporally sensitive attributes. The correct approach is to present the complete analysis but understand the data, understand the limitations of the technique, and interpret the results accordingly.

Most important, Brainerd-Robinson coefficients should never be used as the sole technique for chronologically ordering sites. Traditional seriation is a superior method for chronology building because (a) it adheres more closely to the presumed patterns that govern stylistic change, and (b) it requires a fuller understanding and familiarity with the data on the part of the researcher. The Brainerd-Robinson coefficient is worth employing in conjunction with traditional seriation methods, because trends in multiple attributes can be converted into a single measure of site similarities using this statistic. So it is another way to consider, assess, and interpret the data.

Another commonly used technique for ordering archaeological sites is cluster analysis. Employing the Brainerd-Robinson coefficients as a similarity matrix, cluster analysis was performed using a variety of linkage algorithms including the single linkage (or nearest neighbor) method, the average linkage method, and the centroid linkage method. The computer package SYSTAT (Version 5) was used for all statistical analyses (Wilkinson et al. 1992). Single linkage builds clusters based upon the distance between the two closest sites or clusters of sites. Average linkage averages all distances between pairs of sites in different clusters to build clusters based

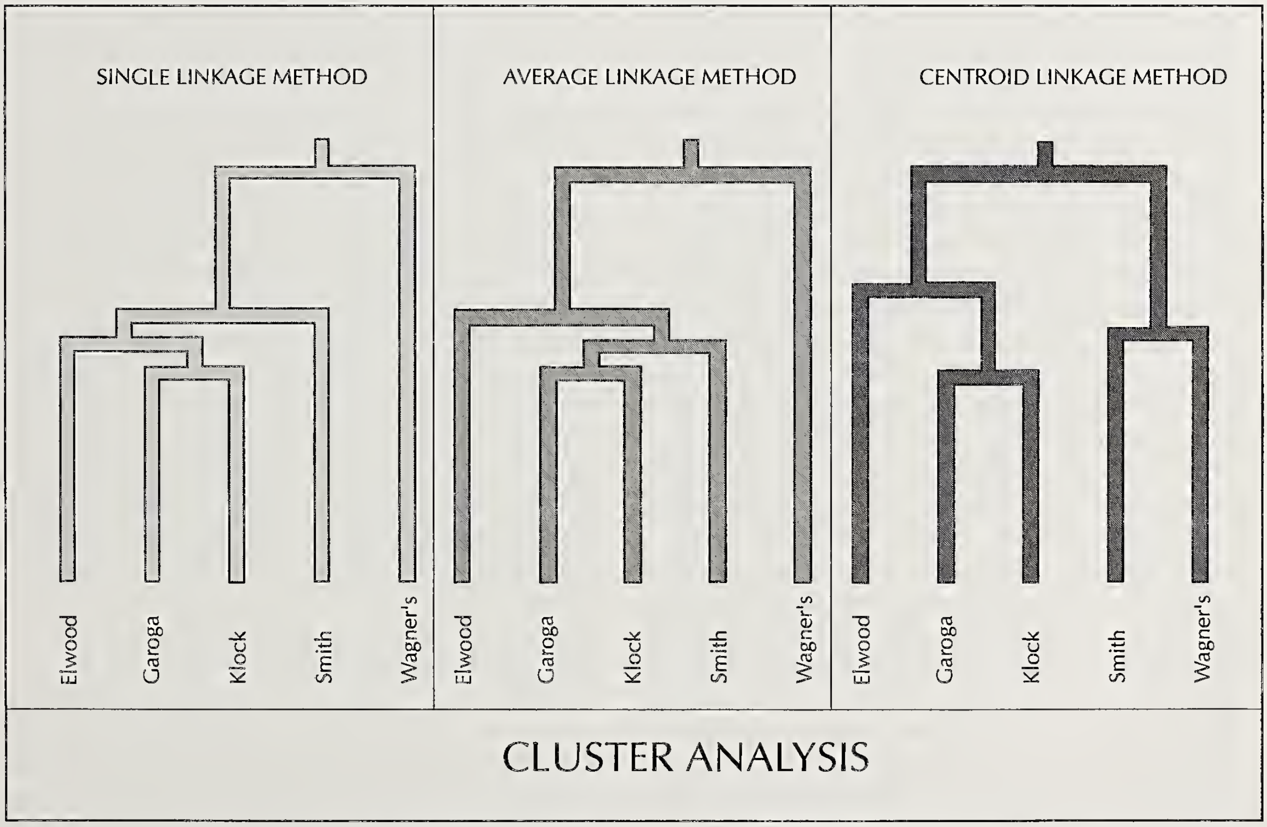


Figure 72. Seration of Mohawk sites: Cluster analysis of Mohawk sites using single linkage, average linkage, and centroid linkage methods.

upon how far apart they are. Centroid linkage uses the average value of all sites in a cluster (the cluster centroid) to calculate distances among clusters and group them. Because there is no statistical reason or archaeological reason to prefer one linkage method over another, the results of all three are presented in Figure 72.

All methods link the Garoga and Klock sites first in an initial cluster. Different methods then group the remaining sites in different sequences. Single linkage adds Elwood to this initial cluster first, then Smith-Pagerie, then Wagner's Hollow. Average linkage adds Smith-Pagerie, then Elwood, then Wagner's Hollow. Centroid linkage builds a separate Smith-Pagerie–Wagner's Hollow cluster, joins Elwood to the Garoga-Klock cluster, then joins the two clusters together.

The results produced from the average linkage method fit best our current interpretations about the relationships of these sites. The Garoga and Klock sites have ceramic assemblages that are the most similar and form the first cluster. This is readily apparent from the Brainerd-Robinson coefficients (Table 44); the two sites have the highest coefficient (179) of any site pair. The Smith-Pagerie site is then linked to the Garoga-Klock cluster to form a three-site cluster of occupations that are extremely close to one another in both time and space. The Elwood and Wagner's Hollow sites are then joined to this central cluster. Because these sites are each presumed to be one site removed from the Garoga–Klock–Smith-Pagerie cluster in time, their addition to the central cluster at greater mathematical distances is expected. All of the linkages are made to the central Garoga-Klock cluster (no separate clusters are formed), suggesting that all five sites may represent a single community relocating over time and in the chronological order: Elwood, Garoga, Klock, Smith-Pagerie, Wagner's Hollow. The average linkage method is one of the simplest and most popular linking algorithms used in archaeological research, and it may produce the most appropriate and interpretable results.

Nevertheless, some cautions are worth considering. First, the average linkage and centroid linkage methods cannot be used to shed any light on the critical question: Which is earlier in time, Garoga or Klock? This is because both methods use averaging to combine other sites or clusters to the initial Garoga-Klock cluster. Therefore they do not indicate whether the linking site or cluster is more similar to Garoga or to Klock. Only the single linkage method can be used to assess the Garoga-Klock temporal relationship. Elwood is the first site to link to the Garoga-Klock cluster, because the Elwood-Garoga coefficient is the second highest coefficient after Garoga-Klock. This implies that Garoga precedes Klock in time, because Garoga is more similar to Elwood than Klock is to Elwood. These associations are readily apparent in the Brainerd-Robinson matrix, and the single linkage cluster diagram is simply a means of illustrating these relationships and not an independent confirmation of the trends. Second, as a comparison of all three cluster analyses shows, emphasizing different relationships in the data leads to different sequences of site linkages. Although they do not produce radically different orderings of the sites, one should not attempt to overinterpret the meaning of the clustering patterns.

In conclusion, the attribute analysis of pottery assemblages from the Garoga, Klock, and Smith-Pagerie sites has contributed to a better understanding of the chronological relationships among the three occupations. In the first Garoga site report, Ritchie and Funk (1973:332) noted that the specific order and chronological placement of these three sites had yet to be resolved. Using traditional seriation techniques, the Brainerd-Robinson coefficient of agreement, and cluster analysis, attribute data from the pottery assemblages of these sites have been thoroughly examined and used to postulate a relative chronology. This chronology places the Garoga site in the earliest position of the three sites, the Smith-Pagerie site in the latest position, and the Klock site in an intermediate position. The results lead us to argue that the position of the Smith-Pagerie site at the end of the three-site sequence is quite firm and conclusive. The relative relationship of Garoga and Klock is, perhaps, somewhat less conclusive but, in our opinion, the weight of the evidence strongly leans toward the Garoga site being the earlier of the two. Until other evidence or new data or a convincing reinterpretation of our own analysis is presented, it should be concluded that Garoga, Klock, Smith-Pagerie is the correct chronological ordering of these three important sixteenth-century Mohawk villages.

VILLAGE RELOCATIONS

Related to chronology building is the question of village movements. It has generally been assumed that sites with closely allied ceramic industries, close in time, and located in the same creek basin represent movements of the same population as local garden fields, firewood, and other resources became exhausted from heavy exploitation. The reconstruction of individual site sequences (sometimes referred to as village lineages) has been a major focus of research in Iroquoian archaeology. The sequences worked out for the Seneca (Wray 1973; Wray and Schoff 1953) and the Onondaga (Tuck 1971) are perhaps the best known in Iroquoia, but other notable efforts have been made relative to these tribes as well as for the Cayuga, Oneida, Erie, and St. Lawrence Iroquoians of New York (Abel 2001, 2002; Bradley 1987; Engelbrecht 1991, 1995; Niemczycki 1984; Pratt 1976; Wray, Sempowski, and Saunders 1991:2–6). The site sequence approach has also been used with particularly good results in Canada (e.g., Fitzgerald 1990; Pearce 1984; Ramsden 1977; Warrick and Molnar 1986; Williamson 1985). For the Mohawk, D. Lenig (1977:71–73), Ritchie and Funk (1973:332), Rumrill (1985), and Snow (1995) have all worked on the problem of sixteenth- and seventeenth-century Mohawk site sequences. W. Lenig (1998) has contributed to our understanding of earlier Mohawk village relationships, and Bamann (1993) has completed an important study defining one Mohawk sequence of fourteenth and fifteenth century sites in the Otsquago drainage, a principal tributary to the Mohawk River.

In their original report, Ritchie and Funk (1973:332) concluded that the Garoga, Klock, and Smith-Pagerie sites were not coeval and that the sites represented a single Mohawk community relocating over time. They argued that the close proximity of the sites made it unlikely that they were occupied contemporaneously, because this would have put an untenable drain on local resources. The significant similarities in the material culture and settlement patterns of the sites and the close proximity of the three sites within the Caroga Creek drainage supported the interpretation of a single village moving over time. They left the temporal order of the three sites to be worked out.

Klock has the fewest longhouses and Smith-Pagerie the most. Klock is the southernmost of the three villages and Smith-Pagerie the farthest north. Therefore a village relocation sequence from Klock to Garoga to Smith-Pagerie has a certain elegance. Under this scenario we can envision a single community ever growing over time and steadily marching northward. These may have been some of the factors considered by Lenig (1977:72) when he proposed just this site sequence, even though his earlier seriation of the sites based on pottery types ordered them Garoga, Klock, Smith-Pagerie chronologically (Lenig 1965:66–67).

The northward-moving sequence conflicts with our current thinking regarding the most likely site chronology. It is also inconsistent with studies of Iroquoian village catchment areas. For example, Heidenreich (1971, 1978:381) states that the Huron typically moved their villages from 2 to 9 miles. Village relocations from Garoga to Klock (2.3 mi) and from Klock to Smith (2.8 mi) exceed the minimum distance of 2 miles, which Heidenreich has argued is necessary for the community to reestablish itself in an unspoiled microenvironment. It is also consistent with Heidenreich's impression that villages moved only far enough to find new land and fresh firewood. In contrast, a relocation from Garoga directly to Smith-Pagerie, as proposed by Lenig (1977:72), is a movement of only 0.5 mile. Given that the two sites occupy essentially the same local niche, it is difficult to imagine what the purpose or goal of such a close move would be. Therefore the site sequence proposed by our current chronology seems to be supported by the prevailing understanding of Iroquoian village movements.

In our scenario, the first of the three villages was Garoga, followed by a move to the Klock site, 2.3 miles to the southwest. For reasons yet to be determined, there seems to have been little growth in the community during this period and perhaps even a slight decline in village population (see demography below). Then, perhaps a generation or more later, the community relocated from Klock to the Smith-Pagerie site, 2.8 miles to the northeast. Smith-Pagerie is close enough to Garoga to suggest that this move may have been conceived of as a return to ancestral lands. The cornfields used when the people lived at Garoga, after laying fallow for a generation, could be burned off and reused when the people occupied the Smith-Pagerie site. Therefore the arduous work of clearing new fields from timbered areas could have been avoided, or undertaken over a period of years while using the old fields associated with Garoga. Perhaps there were sociocultural or even emotional reasons for the return as well. During this period of time there were significant increases in the population of the village. It is possible that these increases necessitated the construction of a larger village on a new site and were a factor in the decision to relocate.

Other possible scenarios are worthy of consideration. The authors have frequently discussed the possibility that Garoga and Klock may represent contemporaneous villages. It has been noted throughout the text that the settlement patterns and material culture of these sites are remarkably similar. This may suggest that they were coeval. The locations of these sites clearly demonstrate that they were purposefully situated for defense. Perhaps two Mohawk communities moved close to each other for mutual defense in a time of heightened warfare. Then they may have eventually joined together and established a single village at the much larger Smith-Pagerie site.

Site contemporaneity can be extremely challenging to demonstrate archaeologically. Although these sites are remarkably similar in many respects, there are enough differences in the ceramic assemblages and other aspects of the material culture to lead us to conclude that they were not contemporaneous. Other than the highly likely overlap of some time as the community moved its village from one site to the other, the sites appear to be sequential rather than coeval. Also weighing against the hypothesis of simultaneous occupations is the idea that the catchments of these two large villages would have overlapped, creating an undesirable strain on local resources. Finally, although the Smith-Pagerie site was clearly occupied by a significantly larger community than was present at the other two sites, it does not appear that it was quite large enough to have housed all the people from Garoga and Klock, if these sites were indeed two separate villages full of people. We conclude that these sites were not coeval for any lengthy period of time.

Some have challenged the assumption that sites in the same drainage necessarily represent the same community or village relocating over time. White (1976:120) has expressed doubt about the reality of reconstructed village lineages, and Snow (1995:44) has argued that it is not currently possible to reconstruct Mohawk village sequences because of a variety of limiting factors. We largely concur with these assessments, especially for the Mohawk. Unlike the other Iroquois tribes, which appear to have been represented by only one or two principal villages relocating over time, the Mohawk had at least three major villages and in some periods more. In addition to the major villages, there were also smaller satellite villages and hamlets. Mohawk villages sometimes merged and other times split apart and regularly completed major moves from one side of the river valley to the other. Because these communities relocated every 20 years or so, they produced numerous archaeological sites. In fact, there are more than 100 known sites within the small tribal homeland of the middle Mohawk Valley (Snow 1995). Even if we had good artifact assemblages from each site, trying to archaeologically reconstruct exact site relocation sequences for the individual communities of the Mohawk tribe would be extremely challenging. Given that large and representative assemblages only exist for a small handful of the sites, the task is currently impossible.

On the other hand, we do have exceptionally large and representative assemblages from Garoga, Klock, and Smith-Pagerie and a good understanding of the village settlement patterns at these sites. The sites are located very close together in the same drainage, the material culture and the settlements are very similar, and they are clearly very close to one another temporally. Currently this three-site cluster probably represents the best Mohawk example of what a segment of a community village relocation sequence would look like archaeologically, and it is appropriate to conceive of the sites in this way even if only for heuristic purposes.

DEMOGRAPHY

Funk (Ritchie and Funk 1973:331) estimated that the Garoga site was occupied by approximately 700 people. This estimate was based on the following assumptions: (a) The number of houses was correctly placed at nine. (b) The houses were all occupied at the same time. (c) Two families shared each fireplace, as recorded in historic documents. (d) About eight hearths (a conservative number) burned within a house at any given time. (e) The average size of the family was five people. Using a higher number of nine hearths per house, Snow (1995:164) estimated there were 820 people at Garoga. He proposed a village population of 720 to 900 at Klock, and of 1,080 to 1,350 at Smith-Pagerie. His estimates for these two sites are higher than preliminary estimates offered by Funk prior to the present analysis (personal communication to Kuhn and Snow ca. 1993).

We propose further revisions of these estimates. The various techniques employed by sundry authors for estimating Mohawk populations from archaeological settlement data should, we believe, be subjected to critical review. Snow used estimates for village areas in conjunction with a standard ratio of one person per given area as the basis for computing population size. For reliable results, this method requires adequate data on both total village areas and house patterns. We have relatively meager information on the number, size, and placement of houses on most Mohawk Valley sites. Even if known with accuracy, total village areas cannot be relied upon unless the space within those villages is known to be filled with houses or other structures. In other words, the number, size, internal structure, and placement of houses within a village comprise the most important data category.

Snow (1995:44) used the relatively superior data from the Garoga site, the Getman site, and the Otstungo site as the foundation for most of his projections. Not only should there be a reexamination of prior estimates for population size at Garoga, Smith-Pagerie, and Klock, but we wish to suggest a revision of Ritchie's interpretation of the settlement data for the Getman site (Ritchie and Funk 1973:291–312).

In attempting to estimate population size, it is usually assumed that a crucial variable, in addition to the number of houses in a village, is the number of midline hearths that would reflect the number of families occupying a house. Although there may seem little choice but to rely on this number, especially in view of the lack of well-defined partitions delineating "family stalls" in nearly all of the excavated houses, the available data on central hearths are notoriously incomplete and ambiguous. First, there is the problem that as families arrived and departed, not all of the hearths in a house may have been used at the same time. Second, some of the fires within particular houses may have, and in fact undoubtedly did, shift from one location to another as families moved about within the houses. This would help to explain the irregular spacing and frequent bunching of fireplaces. Tightly grouped hearths could not all have contained fires at the same time. Third, there are difficulties deciding which hearths actually belonged on the midline. In many houses some hearths were located off the midline; some of these were far enough from the walls to have been used without damage to the framework, but others were situated under bed lines and near walls and could not have contained fires during the lifetime of the houses. Fourth, evidence of some midline hearths, especially shallow amorphous patches of fire-reddened soil, would have been obliterated by historic cultivation, tree falls, amateur digging, and so on. Fifth, the Mohawks' habit of frequently digging storage pits in the center of aisles must occasionally have destroyed fireplaces. Sixth, a number of fires may not have been hot enough, or deep enough in a chosen hearth location, to leave a permanent mark in the ground. Finally, the incomplete excavation of houses, especially if large blocks are left in the central portions, may fail to reveal the hearths that are present, or if some are uncovered, may force the interpreter to estimate the total number and spacing of hearths from very inadequate data.

We might also keep in mind that some of the most completely exposed houses at Klock and other sites showed evidence of incomplete occupancy, as inferred from the absence or near absence of features in certain sections. Some of these sections may have also served as storage areas. Therefore some houses may never have been completely filled by people. Another problem is that, despite the neatly arranged internal structure of houses described in historic chronicles, perusal of the maps for the three sites reported here demonstrates that storage pits were often not regularly spaced or located directly across from each other and in line with fireplaces. Some pits occurred in lines along one side of a house, but not on the other. Along with the lack of consistent evidence for regular lines of post molds at right angles to side walls that would suggest partitions, this raises the intriguing possibility that the notion of modular, repeated family compartments needs to be reexamined. Was the actual situation inside a Mohawk longhouse in the sixteenth century much more chaotic than usually imagined? Most European accounts are from the late seventeenth or early eighteenth centuries, and the regularities observed in longhouse construction may have at least partly been influenced by European ideas. All of the listed factors make estimating population size a very challenging and uncertain endeavor. We will examine three approaches: the number of midline hearths within houses, the number of family compartments or stalls, and the density of pit features.

Estimates Based on Midline Hearths

Estimating population based on the number of midline hearths is, as stated above, problematic. Nevertheless, we think the effort has to be made; it provides another set of figures to compare with the alternate methods employed, such as making estimates from compartment size.

The data on hearths from the most completely excavated houses at Garoga, Klock, and Smith-Pagerie are employed as a baseline to extrapolate to the less well known houses. The lengths of some houses on each site were determined, even in cases of incomplete excavation. Those lengths are summed, and the total is divided by the number of those houses to arrive at an average length for houses on the site. Then the average length is applied to the houses for which exact length is unknown, resulting in another total. These totals are then added together to provide a number representing the total length of all houses on the site. The total number of central hearths observed in excavation of the houses is then divided into the total *excavated* length to provide a ratio for the site: one hearth per unit of length. This ratio is the clue to the total number of midline hearths that existed in both excavated and unexcavated parts of the houses on the site. This result is divided into the estimate for the total combined lengths of houses. Doubling the resulting number then equates with the total number of compartments and families on a site. Multiplied by five, the usual figure for the size of an Iroquoian family, provides the population at the whole site. This method eliminates the arbitrariness of estimates based on a standard number of central hearths pulled "out of the blue" in the manner employed by Funk and Snow for the Garoga site. The results are as follows.

Garoga Site

House 1. 154 feet long. Fourteen central, coeval hearths in 154 excavated feet, or 1 hearth per 11 feet of length. Fourteen hearths equals 28 compartments and 28 families or 140 people.

House 2. 212 feet long. Four central hearths in 45 excavated feet, or 1 hearth per 11.3 feet. This implies 19 total hearths or 38 compartments, 38 families, 190 people.

House 4. 187 feet long. Two central hearths in 28 excavated feet at the east end, or 1 hearth per 14 feet. This implies 13 total hearths or 26 compartments, 26 families, 130 people.

House 5. 175 feet long. Seven central hearths in 70 excavated feet, or 1 hearth per 10 feet. This implies 17 total hearths or 34 compartments, 34 families, 170 people.

House 9. 212 feet long. Three central hearths in 38 excavated feet at the west end, or 1 hearth per 12.7 feet (the excavated eastern part of this house is not included, because the side walls were so intermittent). This implies 17 total hearths or 34 compartments, 34 families, 170 people.

Thus there were 30 central hearths uncovered in 335 linear feet of excavated longhouse floors. So the average observed for Houses 1, 2, 4, 5, and 9 is 1 hearth per 11.2 feet. The estimated total length of Garoga houses is 1,815 feet. This implies there were about 162 hearths, 324 compartments and 324 families or 1,620 people.

Klock Site

House 1. 212 feet long. Eight central hearths in 187 excavated feet, or 1 hearth per 23.4 feet. This implies 10 total hearths or 20 compartments, 20 families, 100 people.

House 3. 82 feet long. Two central hearths in 40 excavated feet, or 1 hearth per 20 feet. This implies 4 total hearths or 8 compartments, 8 families, or 40 people.

House 4. 154 feet long. One central hearth in 80 excavated feet, or 1 hearth per 80 feet. This implies only 2 total hearths or 4 compartments, 4 families, 20 people.

House 7. Length unknown, but two central hearths uncovered in 30 excavated feet, or 1 hearth per 15 feet.

Thus there were 13 hearths uncovered in 337 feet of excavated house floors. So the average observed for Houses 1, 3, 4, and 7 amounts to 1 hearth per 26 feet. If the total house length at Klock was 1,025 feet, then there was a total of 39 hearths or 78 compartments, 78 families, 390 people.

Why so few hearths at Klock? Was the site special in some way? The number of hearths seems unusually low in Houses 1, 3, and 5. Was House 5, in particular, a specialized structure, such as a council house or ceremonial place?

Smith-Pagerie Site

House 1. Length 230 feet. Seven midline hearths in 230 excavated feet, or 1 hearth per 33 feet. This implies 7 total hearths or 14 compartments, 14 families, 70 people.

House 2. Length 145 feet. Three midline hearths in 30 excavated feet, or 1 hearth per 10 feet. This implies 14 total hearths or 28 compartments, 28 families, 140 people.

House 3. Length 190 feet. Nine midline hearths in 65 excavated feet, or 1 hearth per 7.2 feet. This implies 26 total hearths or 52 compartments, 52 families, 260 people.

House 4. Length about 90 feet. Seven midline hearths in 90 excavated feet, or 1 hearth per 12.8 feet. This implies 7 total hearths or 14 compartments, 14 families, 70 people.

House 5. Length about 60 feet. Two midline hearths in 60 excavated feet, or 1 hearth per 30 feet. This implies 2 total hearths or 2 compartments, 2 families, 10 people.

Thus there were 28 hearths uncovered in 475 linear feet of excavated longhouse floors. So the average observed for Houses 1 to 5 is 1 hearth per 17 feet. If the total length of houses at Smith-Pagerie site is 2,288 feet, there would be a total of 135 hearths or 270 compartments, 270 families, 1,350 people.

Estimates Based on Number of Family Compartments

Given the problem of dealing with hearths as a measure of group size inside the longhouse, it is tempting to fall back on calculations of the number of family stalls within houses based on a historically or archaeologically derived figure for their length, divided into the lengths of houses at a site. This method has its own pitfalls, but it provides one way to approach the problem of attaining "ball park" estimates for village populations.

The method proposed here of basing population estimates on the number of family apartments employs the total combined lengths of houses used above in the method based on hearths. The next step relies heavily on ethnographic accounts of the length of family compartments in early historic Iroquoian villages visited by European observers. These accounts are not entirely in agreement with one another. John Bartram, visiting Onondaga in 1743, described the house where he was lodged as 80 feet long, containing a central aisle or walkway where fires were located. Family apartments were situated along the sides of the house opposite the fireplaces. These apartments or stalls were 5 to 6 feet wide and 6 to 7 feet long (Bartram 1751). Because these apartments are described as much shorter than in other accounts, some writers speculated that Bartram was in a council house rather than a regular dwelling. Lafitau (Fenton and Moore 1974), writing in 1724 about Iroquois settlements in the St. Lawrence Valley of Quebec, stated that family apartments were 12 or 13 feet long and located opposite central fireplaces. *The Jesuit Relations* for the years 1638 to 1639 describes Iroquois houses and states that the midline fires were spaced two to three paces apart, or 6 to 9 feet, which would correspond roughly to the length of a family apartment (Thwaites 1959). And Lloyd, in Morgan (1901:290), summarizing house forms and dimensions, gives a figure of 18 to 20 feet for the length of apartments.

A careful reading of Lafitau (Fenton and Moore 1974) reveals some confusion in his description of longhouse interiors. He speaks of "fires" from 20 to 40 feet long, which could be interpreted as references to family compartments within a house. However, Lafitau also clearly states that individual family apartments or sleeping areas were 12 to 13 feet long, 5 or 6 feet deep, and "shut in on all sides except that of the fire." In writing about the "fires" 20 to 40 feet long, Lafitau may have been referring to major sections of houses, or even to whole houses, rather than individual family apartments.

Another source of data on apartment dimensions is to be sought in archaeological data. Ritchie, in his report on the Getman site (Ritchie and Funk 1973:296–299), saw what he interpreted as apartments 10 to 12 feet long in the post-mold patterns of House 1. However, farther afield in southern Ontario, discussing Huron houses, Ramsden (1990a:378) states: "Clear-cut patterns of posts that might reflect the historically described interior partitions or bench supports, however, are the exception rather than the rule, and it seems clear that the internal arrangement of a longhouse was a matter for pragmatic design, probably reflecting the varying size and varying social nature of the household." Our perusal of other reports on Iroquoian sites tends to support this view despite the truly incredible amounts of broad-scale fieldwork accomplished on sites in Ontario and the less extensive data on internal longhouse patterning available in New York. There is little archaeological evidence throughout Iroquoia bearing on the problem of interior partitions and compartments.

Here we employ two alternative ethnohistoric measurements for our calculations, that of Bartram (7 ft) and that of Lafitau (13 ft). After arriving at two alternative estimates of the number of compartments per linear distance within longhouses at a given site, these figures are doubled to provide the total number of compartments and therefore the total number of families within the house. Finally, the resulting numbers are multiplied by five, an ethnohistorically derived figure for the average size of an Iroquoian family, and this provides our estimates for the number of inhabitants at a given site. It must be reiterated that there is little archaeological evidence for partitions and compartments in excavated longhouses. The following summarizes our results.

Garoga Site

Range in lengths of Houses 1 through 9, 11: 87 to 225 feet.

Average length of individual house: 165 feet.

Total length of all 11 houses on site (combined lengths of Houses 1–9, 11 plus estimated length of House 10 at 165 ft): 1,815 feet.

Number of compartments if each 7 feet long: 518. People: 2,590.

Number of compartments if each 13 feet long: 280. People: 1,400.

Klock Site

Range in lengths of Houses 1, 3, 4, 5: 65 to 212 feet.

Average length of individual house: 128 feet.

Total length of all eight houses on site (combined lengths of Houses 1, 3, 4, 5 plus addition of estimated average length of 128 feet each for Houses 2, 6, 7, 8): 1,025 feet.

Number of compartments if each 7 feet long: 293. People: 1,465.

Number of compartments if each 13 feet long: 158. People: 790.

Smith-Pagerie Site

Range in lengths of Houses 1 through 5: 60 to 230 feet.

Average length of individual house: 143 feet.

Total length of all 16 houses on site (combined lengths of Houses 1–5 plus addition of estimated average length of 143 feet each for Houses 6–16): 2,288 feet.

Number of compartments if each 7 feet long: 653. People: 3,265.

Number of compartments if each 13 feet long: 352. People: 1,760.

Estimates Based on Density of Pit Features

Another way to examine site parameters reflecting the size and intensity of occupancy is to calculate the density of storage pits per area of house floors. This is accomplished by using the total excavated areas of house floors in square feet and also the total number of excavated pits. The excavated areas of houses are summed up and divided by the total number of pits recorded within the houses. This provides a value for floor area per pit, which is then divided into the total estimated area of all house floors on a site, giving the total estimated number of pits within houses. Assuming that each storage pit represents one family, multiplying the total estimated number of pits times five provides an estimate for community size. The results are presented below.

Garoga Site

Total area of excavated house floors: 15,475 square feet.

Total number of storage pits recorded in excavated houses: 255

Ratio: 1 pit per 60.7 square feet.

Total estimated area of all house floors: 36,520 square feet.

Total estimated number of pits in all houses: 602.

Estimated population: 3,010 people.

Klock Site

Total area of excavated house floors: 6,926 square feet.

Total number of storage pits recorded within excavated houses: 55.

Ratio: 1 pit per 126 square feet.

Total estimated area of all house floors: 21,300 square feet.

Total estimated number of pits in all houses: 169.

Estimated population: 845 people.

[C]Smith-Pagerie Site

Total area of excavated house floors: 12,295 square feet.

Total number of storage pits recorded in excavated houses: 125.

Ratio: 1 pit per 98.4 square feet.

Total estimated area of all house floors: 45,760 square feet.

Total estimated number of pits in all houses: 465.

Estimated population: 2,325 people.

The imponderables connected with estimates based on pit features are as difficult to control as the procedure based on hearths or compartment lengths. It may be reasonable to assume that, within a longhouse, on average each family dug and used one storage pit. In a fully occupied house, each family would be chiefly confined to one compartment and share a central hearth with the family in the opposite compartment. In some cases, however, a family might dig a new pit on the aisle when the pit under its beds became infested with mold or vermin or filled with refuse. As noted previously, storage pits along the aisles are fairly common on the sites described here, even in houses apparently not fully occupied. Occasionally families in incompletely occupied houses might have a bit of "elbow room" and be able to dig pits in more than one part of the houses. It is also possible that there was room for two pits under the bed lines in each compartment, assuming that pits conformed to the average diameter of 3 feet actually observed in the sites described here and that a space of 2 or 3 feet was needed between pits. Families may have also stored foodstuffs in above-ground bark barrels stored in unoccupied parts of longhouses, as attested in historic accounts.

Another confounding factor involves the pits located outside houses. Some of these may have been within possible but poorly defined extensions of those houses (the Klock site comes to mind) or in other houses that were either not recognized as such in our explorations or obscured by plowing and the superimposition and overlapping of the mapped houses. But many pits were definitely located outside particular houses. Some could have provided extra storage volume for families living in houses or served as communal storage facilities in open-air activity areas. The implication is that in the course of its residency on a site, a single family might be responsible for more than one pit, perhaps as many as four or five. But this cannot account for the seemingly inflated population estimates based on pits located within houses.

Comparison

Comparing the estimates of population based on the three methods, we observe quite a large range. Even omitting the estimates based on compartment lengths of 7 feet, the differences are considerable, as seen below.

Garoga: 1,400, 1,620, and 3,010 people.
Klock: 790, 370, and 845 people.
Smith-Pagerie: 1,760, 1,350, and 2,325 people.

On what basis do we choose among these different numbers?

Looking at other sites that have contributed to existing models of Mohawk Iroquois cultural development, it is obvious that the Getman and Otstungo sites play major roles. Settlement data are nearly nonexistent on other Mohawk sites earlier than Garoga.

Funk's study of the detailed map showing the Getman site excavations, half of which was not published in Ritchie and Funk (1973:Figure 28), convinced him that Ritchie's reconstruction of longhouse outlines needs to be modified. Instead of five or six houses, varying widely in length and orientation, some jammed up against others, it seems clear that there were three relatively long houses, a probable fourth house, and space within the palisade for a possible fifth house. Houses 1 and 2 as designated here were parallel to each other, and House 3 was oriented at a slight angle to House 2. Because of this angle, House 2 ended on the east near the north wall of House 3.

Ritchie inferred that House 1 was 86 feet long (and end to end with his House 2), but the actual length was at least 200 feet. This modified length includes his House 2. House 2 in our nomenclature is the same as Ritchie's House 3 and was 150 to 160 feet long. House 3 that includes his Houses 4 and 5 was more than 160 feet long. The uncertainty about exact lengths results from the limited areas excavated. The east ends of Houses 1 and 3 and the west end of House 2 remain in unexcavated areas of the site. The proposed revision of the Getman house patterns is presented in Figure 73.

Ritchie estimated that 160 to 200 people lived at Getman at any one time. This estimate was based on the data from House 1, where 9 midline hearths occurred in a distance of 86 feet, and on the ethnohistoric accounts of family apartments 10 to 13 feet long. He hypothesized an eight-family dwelling containing 40 to 50 people and extrapolated these figures to the other houses, assuming that four houses coexisted at a given time.

Also Ritchie's reconstruction of the House-1 floor plan shows a "cabin" neatly divided into 13 compartments, although the present authors are hard pressed to see more than three or four convincing lines of post molds suggesting partitions on the detailed map. Two of the hearths on the detailed map seem too close together to have been used at the same time. But assuming that eight hearths contained fires at the same time, and that each fire represents 2 families, then 16 families and around 80 people are implied by the data. Intuitively this seems a bit excessive, but the method compels the larger figure.

If the total combined length of Houses 1 through 3 was around 512 feet (it was probably longer in prehistoric reality), and hearths occurred every 11 feet (as indicated by the data from exposed portions of House 1), then there were approximately 47 hearths on the site. This equates to 94 families and 470 people. Basing calculations on the assumption that houses were divided into compartments 13 feet long, then there were 39 compartments, 78 families, or perhaps 390 people living at Getman. This figure would be higher if in fact two more houses existed alongside the others. The evidence for these houses is inconclusive, however, although House 4 is suggested by a cluster of molds south of House 3 in the main excavated area. Coincidentally, the second population estimate is close to that offered by Snow (1995:114–115), of 70 people in House 1 and 240 to 400 for the whole Getman site.

The University at Albany team investigated the Elwood site, a Chance-horizon village on the south side of the Mohawk River near Minden. A longhouse 30 to 36 meters long and 6 meters wide was completely exposed (Snow et al. 1985; Snow 1995:98–108). Post molds scattered throughout the interior showed no discernible patterning, and Snow

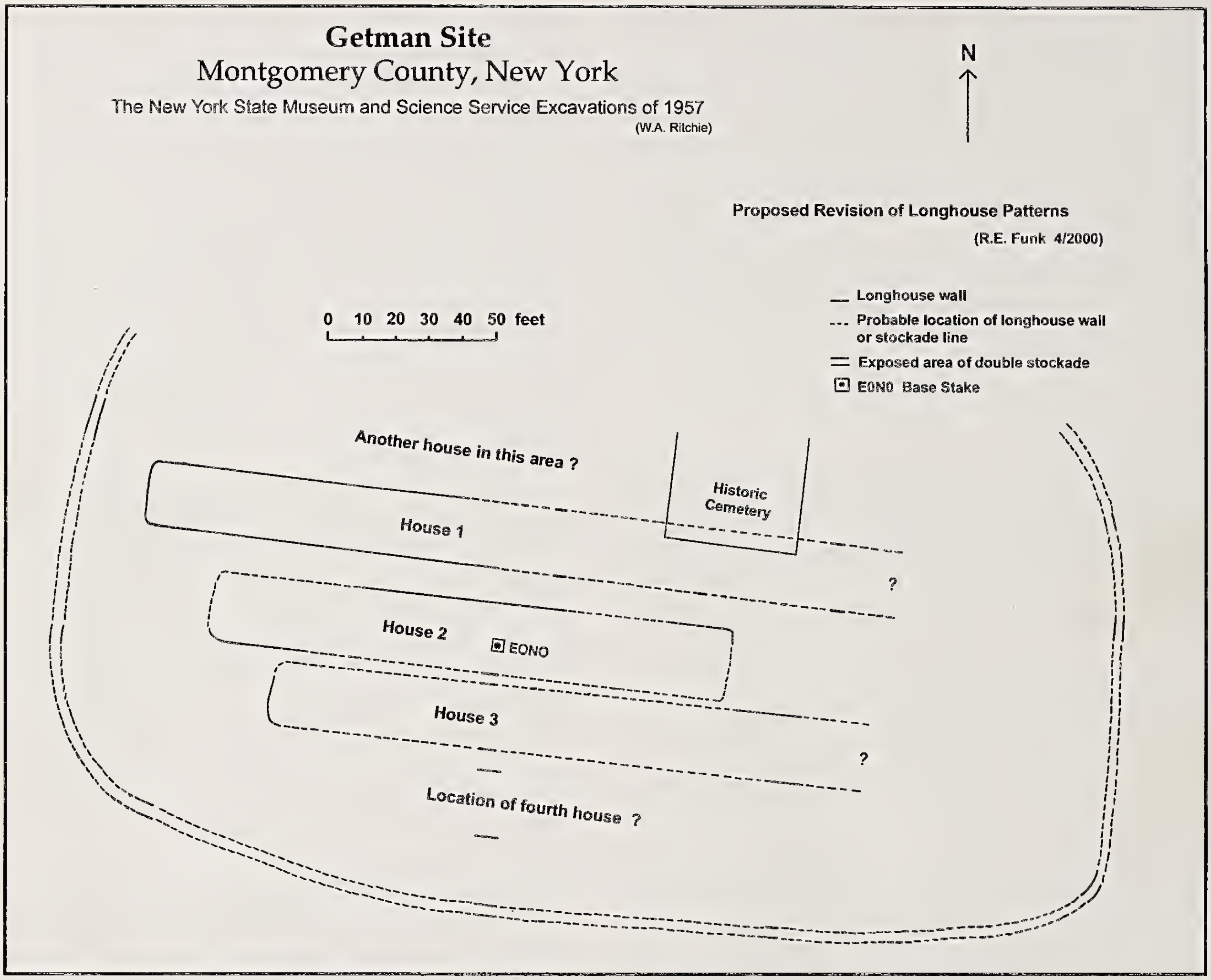

Getman Site
Montgomery County, New York
The New York State Museum and Science Service Excavations of 1957
(W.A. Ritchie)
N
Proposed Revision of Longhouse Patterns
(R.E. Funk 4/2000)
0 10 20 30 40 50 feet
Longhouse wall
Probable location of longhouse wall or stockade line
Exposed area of double stockade
E0N0 Base Stake
Another house in this area ?
Historic Cemetery
House 1
?
House 2
E0N0
House 3
?
Location of fourth house ?

Figure 73. Revised map of Getman site settlement plan, showing longhouses and palisade.

recognized that the ends drawn on the map (Snow 1995:Figure 3.4) are somewhat conjectural. In the absence of post molds, they were based on the presence of midline hearths at those extremities. Snow postulated four or five internal compartments, predicated on the location of seven hearths, and estimated the house lodged 40 people. An amorphous line of molds 16 meters (53 ft) long near to and parallel to the house was interpreted as a double-walled stockade rather than another house. The precise site boundaries were difficult to determine because of large expanses of shallow bedrock, a road that prevented access to part of the site, and the broad, flat nature of the hilltop. Snow (1995:106) estimated its area at 2,000 square meters (21,528 sq ft) and suggested there were three houses during occupation. He further suggested the population was about 100 people.

Because the Otstungo site was never plowed, features and debris within house walls were generally in their original positions. Snow (1995:115–138) conducted a magnetometer survey of the whole site and was rewarded with the discovery of several dozen subsurface hearths. Many of these were confirmed by soil augering or shovel-testing. All of the hearths occurred in lines varying in length, thereby suggesting the positions of longhouses with rows of central fireplaces. A segment of one such row on the highest, flattest part of the site was excavated and appeared to represent one complete house. However, Snow recognized that the house may have been somewhat longer than his estimate of 38 meters (125 ft). Other lines of hearths 15 to 30 meters (50–100 ft) long may denote up to six more houses, for a total of seven.

Snow (1995:136) proposed a village population of at most 630 people. This is in agreement with our own calculations, based strictly on the total number of identified hearths (62). The value of the Otstungo site for demographic purposes lay in its relatively undisturbed nature. All or nearly all of the hearths remained intact, because none was impacted by plowing. Also the Otstungo village is neatly bounded by its topographic situation, advantageous for defensive purposes. Similarly the Getman site's value lies in the fact that the stockade provided a well-bounded habitation area.

Snow relied heavily on the Otstungo data for his ratio of people to village area (7,572 sq m / 630 = 1 person per 12 sq m). His study of the Getman site data using Ritchie's interpretation of compartments in House 1 led him to project a population of from 240 to 400. These figures translate into person-to-area ratios of either 1 to 20 or 1 to 12 square meters (1:215 or 1:129 sq ft), the latter close to the value for Otstungo. Snow uses both sites as the basis for estimates of population on other Mohawk villages, prehistoric and later.

Thus it may be significant that our estimates for Otstungo and Getman approach Snow's. The fundamental question is whether the person-per-area ratio established for these sites can be applied with confidence to other Mohawk sites of the same and later periods. The sample is small compared to all the late prehistoric sites recorded for the Mohawk Valley. Our reexamination of the Getman site data also calls into question the common assumption that Chance-horizon village areas, population size, and longhouse lengths were consistently smaller than those of later periods.

As seen above, Snow's estimates for Garoga-horizon populations do not match ours. The reexamined and revised settlement patterns for the Garoga and Smith-Pagerie sites, using three different methods of computation, indicate larger populations than he suggested. Our estimates for the Klock site based on compartments 13 feet long and on pit features are very close to Snow's, but the estimate based on hearths is, surprisingly, very low (370 people). It is possible that some hearths at Klock were plowed out or missed by the State Museum crews due to the dark, boulder clay subsoil, and there is the possibility that enigmatic Houses 3 and 5 were different from the general run of Mohawk houses.

As another consequence of our analysis, there is no pattern of successively larger populations in the sequence Garoga to Klock to Smith-Pagerie. The Klock site data instead suggest a short-term dip in numbers of inhabitants along Caroga Creek.

The settlement pattern evidence for all other sites that have been subjected to archaeological investigation, including some that have produced artifact assemblages important to the developing picture of Mohawk cultural evolution, is not as complete as might be desired. At the Cayadutta site, a Garoga-horizon village contemporaneous with Garoga, Klock, and Smith-Pagerie, the general village location is known and the bounds on one side were established by the delineation of the palisade through excavation (Snow 1995:180–191). There are no data on longhouses, so Snow used his estimate of the total village area (8,050 sq m or 86,650 sq ft) and the formula of 1 person per 12 square meters (1 person per 129 sq ft) to come up with a population of 670 people.

For the seventeenth century, the only data on longhouses were obtained at the Rumrill-Naylor site (Snow 1995:309–322). One house 38 meters (125 ft) long was completely excavated, and a major portion of a second house about 30 meters (100 ft) long was exposed. No storage pits were found, and interior partitioning is not evident (Snow 1995:Figure 8.9), but there were several hearths on the long axis of each house. No other house patterns were investigated. Based on the account of Van den Bogaert (Gehring and Starna 1988), Snow believes the site is the seventeenth-century village of Canagere, for which Van den Bogaert reported 16 houses. Snow's tests showed that the village lacked a palisade, which corresponds to Van den Bogaert's statement that Canagere had no defenses. Snow's population estimate of 730 people was derived from Van den Bogaert's account.

The Oak Hill No. 1 site was also excavated by Snow (1995:334–360). A large area was opened, but regrettably only a small number of scattered post molds and no coherent house patterns were present. Giving the size of the site as 10,600 square meters (114,000 sq ft), Snow estimates a population of 530 people, using his formula of 1 person per 20 square meters (1 person per 215 sq ft).

A magnetometer survey was accomplished at the Horatio Nellis site, and some hearths were confirmed by shovel testing. In the absence of block excavation, no house patterns were confirmed. The area of the site was estimated as 4,500 square meters (48,438 sq ft) and the population as 225 people (Snow 1995:384–389).

For the late seventeenth century, the best-known excavation that has revealed a complete village was carried out at the Caughnawaga site, on the grounds of the Franciscan Order of Minor Conventuals in Fonda, New York (Snow 1995:431–443). This work was under the direction of Father Thomas Grassman (1969). The village consisted of 12 longhouses enclosed by a square palisade. Associated with the houses were a relatively small number of hearths and rare storage pits. Although some hearths within the putative longhouses occurred in lines, careful examination of the maps (Snow 1995:Figures 11.3–11.15) showing details of post molds, features, and stockade poses some real problems. The maps reveal a great and confusing number of post molds within the stockade, some occurring in dense clumps. Some of the house outlines as drawn on the maps, and as shown on the actual site by stakes driven into the ground following excavation, appear far less convincing to us than various accounts would indicate. A reassessment of the settlement data at Caughnawaga seems called for.

Snow (1995:431, 443) gave the village area as 3,565 square meters (38,373 sq ft), readily determined from the area enclosed by the palisade, and estimated the population at 300 people. He derived this number from the longhouse data, even though his standard formula of 1 person per 20 square meters (1 person per 215 sq ft) would suggest only 178 people. We suggest that because there is some doubt about the published longhouse patterns, population estimates for Caughnawaga should be reevaluated.

In addition to the sites discussed here, Snow (1995) described numerous other sites, a small number of which were subjected to brief field investigations by his crews. He recognized that there are a variety of other site types besides villages, which are the usual focus of archaeological activity. Very few of those other types, including isolated houses, hamlets, fishing camps, chert quarries and workshops, to name a few, have been scientifically excavated and undoubtedly many remain undiscovered. We also confess to some doubt that all of the major villages have been located by amateur and professional activity through the years. Not only do we feel that a number of habitation sites remain to be discovered in the back country, but there may also be sizable sites located on or in the Mohawk River floodplain, similar to the large villages reported by Dragoo (1977) on the floodplain of the Allegheny River, in western New York and Pennsylvania. W. Lenig (1998; personal communication March 2000) informed the writers about extensive sites on the Mohawk River floodplain, on which there are surface indications of late prehistoric occupations and multiple longhouses. These sites have not been tested, at this writing. It also seems likely that some major village sites have been completely lost, without surviving records, due to the development of villages and cities such as St. Johnsville, Canajoharie, Johnstown, and Amsterdam. Obviously a large-scale program of systematic, intensive survey is needed, stratified by environmental parameters, in order to better understand late prehistoric and early historic settlement and subsistence systems of the Mohawk. Although the largest groups of people undoubtedly resided in the villages, population estimates must remain very tentative and speculative until such surveys have been completed.

Another problem is the lack of information on the physical anthropology of the Mohawk, even though some burials have been excavated by nonprofessional and professional archaeologists alike. As stated previously, cemeteries associated with Chance- and Garoga-horizon settlements have not been located, despite intensive search. One burial was found in a pit at Garoga by Harrington (1905), unique to the period, but most burials have been found on later sites of the seventeenth century, such as Rice's Woods, Kilts, Briggs Run, and Wagner's Hollow. Important data on the physical characteristics, pathology, traumas, genetics, and dietary habits of human populations can be obtained from human remains, but restrictions placed on their study by implementation of the Native American Graves Protection and Repatriation Act create considerable doubt that such studies will be completed or if completed even published.

There is no denying the value of early accounts, especially the crucial one of Van den Bogaert, to aid in reconstructing Mohawk village histories, community movements, and demography from 1635 on. We are concerned, however, that given the very limited amount of recorded fieldwork in the Mohawk Valley by all parties, ourselves included, the available data do not encourage confident use of population estimates for the region in late prehistoric times. The demographic interpretations and general trends proposed by Snow (1995) and by Snow and Starna (1989) may be reasonably close to the reality. But much more fieldwork is needed, on a scale broad enough to delineate entire village patterns via an adequate sampling program. This "ground truth" is the only way to test hypotheses about the major issues of contemporary northeastern archaeology, including identification of the villages seen by early European travelers. Only then may archaeologists arrive at firm conclusions about the history, development, and demography of Native American settlements in the Mohawk Valley.

LIFEWAYS AND SOCIAL ORGANIZATION

Investigations at the Garoga, Klock, and Smith-Pagerie sites have enhanced our knowledge of the lifeways of the Mohawk people in the era prior to their direct contact by Europeans. They lived in large, easily defended hilltop villages up to 5 acres in size. These villages were located in the uplands, well back from the Mohawk River, and they were composed of densely packed longhouses occupied by many hundreds of people. Mohawk communities of this time relied on a resource base of corn, beans, and squash—the traditional "Three Sisters"—for their primary subsistence, but also depended on the wild animals and plants of the Mohawk Valley and surrounding territories to provide complete nutrition that could support their very active lives.

These people moved their villages regularly, perhaps once every 10 to 20 years, and the Garoga, Klock, and Smith-Pagerie sites appear to represent the remains of a single community's occupation of three sequential sites over time. Exhaustion of the cultivated soils and available firewood near the village, building decay, infestation, and refuse accumulation were quite likely among the many reasons that factored into a village move (Starna, Hamell, and Butts 1984). Although these moves occurred on a regular basis, they must have represented a major event in the life of the community. Traumatic historical events are also known to have caused Mohawk villages to relocate (Snow 1995:362).

Village sites along the Caroga Creek appear to represent the antecedents of the westernmost Mohawk village recorded during historic times. When Europeans first visited and became familiar with the Mohawk tribe in the seventeenth century, they recorded that the Mohawk maintained three (sometimes four) principal villages, which they called castles (a small misnomer). According to these early writers, the western village, or upper castle, was the largest of the Mohawk towns; they sometimes referred to it as the Mohawk capital. The Mohawk's name for the western village was Tenotoge, although spelling and pronunciation varied (Fenton and Tooker 1978:467; Gehring and Starna 1988; Snow 1995:37–39). Because Iroquois village names frequently stayed the same as they moved over time, the Garoga, Klock, and Smith-Pagerie sites may represent the community of Tenotoge about 50 to 100 years (three to five generations) before that community was first contacted by Europeans. This is largely speculation that cannot be easily verified by archaeology. Nevertheless, equating these sites with the community of Tenotoge helps one to conceptualize the people who lived there in human terms, rather than as an archaeological culture. As such, it serves a heuristic purpose.

If archaeology is any guide, this community of Mohawk can be characterized as one of great stability, tradition and cultural conservativism over the course of much of the sixteenth century. Although population estimates must be proffered with some caution, it appears that village size was generally stable, within a normal range of fluctuation, or growing through this period. Some have argued (Dobyns 1983) that the sixteenth century was a period of catastrophic epidemics among Native American populations, but we see no conclusive evidence to support such a claim for the Mohawk. We agree with Snow's conclusion that there is no archaeological evidence for disease episodes among the Mohawk until the seventeenth century (Snow 1992, 1996; Snow and Starna 1989).

In the mid-sixteenth century this community of Mohawk occupied villages that ranged in size from 8 to 16 or more longhouses. These houses were usually about 20 feet wide, but they ranged considerably in length. Some houses were as long as 230 feet. The traditional Iroquois longhouse sheltered multiple nuclear family units related by matrilineal descent, although historic data suggest that such relationships could often have been fictive. Each house contained a lineage, a segment of a larger matriclan that might occupy more than one house within the village. Kinship dominated not only living arrangements within the village, but also all aspects of social and political organization (Fenton 1978).

One or more lineages of real or fictive descent combined to form a clan. Clan membership was an integral component of Iroquois social and political organization, because the clans served important functions in ritual and ceremony and defined village and tribal leadership positions. The Mohawk were divided into three clans, Turtle, Bear, and Wolf (Jameson 1909). Fenton and Tooker (1978:467) argue that lineages of the three clans were present in all the principal Mohawk villages, but that one clan was dominant in each. Tenotoge, the westernmost community of the Mohawk, was the home of the Wolf clan. Turtle was the dominant clan in the easternmost village of the Mohawk, and the Bear clan in the middle village.

So far, such dominant clans have not been identified archaeologically, although it has been suggested that clues might be found in the occurrence of unusually large houses on sites. Further, nobody has yet succeeded in demonstrating the existence on earlier sites of any of the clans noted in historic accounts. But it is possible to imagine a scenario, unlikely as it seems, in which archaeologists are lucky enough to find durable items bearing unmistakable images of the Turtle, Bear, or Wolf in good association with particular houses or clusters of houses on a site. Even less likely, it is conceivable that each clan would prefer its own variation on the basic longhouse plan. Such variation might be detected archaeologically.

One might also attempt to test the hypothesis of the presence of lineages and/or clans by looking for tight associations of ceramic attributes within houses or within well-defined groups of houses that contrast with associations in other houses on a site. A similar type of study was carried out by Brumbach (1985) in an effort to discern the existence of matrilocality at the Smith-Pagerie site. The hypothesis was that two or three generations of related women living in the same house would be likely to produce pottery that shared certain attributes contrasting with attributes on pottery produced by women in other houses on the same site. If matrilocality was not the rule, then women would move more freely among houses after marriage, and there would not be significant contrasts in the pottery recovered from different houses. Brumbach was able to demonstrate more homogeneity within the samples from House 1 than between Houses 1 and 3 at Smith-Pagerie, thus supporting the hypothesis, although she did not claim to have eliminated factors other than matrilocality as an explanation for this pattern. Such investigations require ceramic samples of adequate size from features associated with particular houses. It is difficult to imagine any source of data other than ceramics that could be applied for this sort of analysis.

What was daily life like in the community that lived along Caroga Creek? Much of the daily activity was undoubtedly devoted to the food quest. Women cultivated corn, beans, squash, and also probably some domesticated sunflower. Tobacco was also grown. Cultivated foods, especially corn, provided the most important sustenance to the people, and the cycle of planting, tending, and harvesting the crops scheduled the seasonal activities of female work cohorts. Women were also responsible for collecting wild edibles, and fruits, nuts, and fresh-water shellfish provided an important addition to the diet, in season. Women's activities dominated day-to-day village life. Raising the children, preparing foods, collecting firewood, making and mending clothing would have been just a few of the activities that occupied their time. Judging from the plethora of potsherds recovered from the Garoga, Klock, and Smith-Pagerie sites, making pottery also appears to have been a nearly never-ending activity of the women and girls.

Men occupied much of their time hunting and fishing. Deer was the primary focus of the hunt, but the wide variety of animal species represented in the faunal assemblages from the Caroga Creek sites clearly indicate that any and all game was taken on an opportunistic basis. Deer hunts were usually conducted in the late fall and early winter, while angling and seining were most popular during spring fish runs. The Mohawk probably traveled to fresh-water lakes to the north to do most of their fishing (Kuhn and Funk 2000:31–39).

The subsistence patterns practiced by the Mohawk during the sixteenth century differ in a number of ways from earlier periods. Most important, there appears to be a significant increase in beaver hunting, undoubtedly triggered by the advent of the European fur trade. The faunal assemblages from earlier sites always have very small amounts of beaver remains, rarely more than 2 percent. In contrast, beaver makes up 10 percent of the faunal assemblages from the Garoga and Klock sites, and almost 20 percent from the Smith-Pagerie site. There appears to be little doubt that the Mohawk were already changing their traditional hunting practices in order to accommodate trade for European goods. Other changes in native subsistence practices, which may have little or nothing to do with the budding European trade, include the increasing exploitation of bear. We have argued elsewhere that this may mark the origination of bear taming and the well-known Iroquois practice of raising bears in captivity for food and for feasts (Kuhn and Funk 2000:51–52). Perhaps some of the small structures and groupings of post molds separate from the longhouses at the Garoga, Klock, and Smith-Pagerie sites may have been used as bear enclosures, a type of structure observed by early European visitors among the Mohawk (Gehring and Starna 1988:6).

Combat and diplomacy were also the traditional domains of the men in Iroquois society, and, judging from the remarkable settlement patterns of the Caroga Creek sites, warfare and politics were important issues to the sixteenth-century Mohawk. The highly defensive nature of these settlements, located along steep cliffs and protected by heavy palisades, stands in stark contrast to Mohawk sites of earlier time periods. It seems apparent that the sixteenth century was a time of dramatically increased warfare and that the Mohawk were extremely concerned about attack and the village defenses.

Whom did the Mohawk consider to be their enemies? A clue may be found in the small numbers of exotic pottery that are found in the ceramic assemblages of these sites. All three sites have rare examples of potsherds that display Northern Iroquoian traits, some Huron but mostly St. Lawrence Iroquoian in style. Klock and Smith have the most; about 2 percent of their pottery samples display St. Lawrence Iroquoian attributes. These are not trade sherds, as compositional analysis has consistently shown that so-called "exotic" pottery on Mohawk sites was made of local Mohawk Valley clays. It seems to us that they likely represent the work of female captives and as such are an indication of conflict between the Mohawk and various Northern Iroquoian groups (Kuhn, Funk, and Pendergast 1993).

As an aside, there has been considerable debate about the number of possible St. Lawrence Iroquoian captives or refugees incorporated into Mohawk communities. When the St. Lawrence Iroquoians were dispersed, apparently no later than ca. A.D. 1580, most appear to have been adopted into Huron communities. Others found their way into eastern Iroquois villages. Based upon the small number of St. Lawrence ceramics on Mohawk sites, we have argued that the number of people incorporated into these communities was small. However, based upon demographic evidence Snow (1995:198, 216) has argued for a fairly large migration of St. Lawrence Iroquoians into Mohawk territory. Because the Smith-Pagerie site appears to have been occupied by a population significantly larger than the preceding Klock site, we cannot dismiss Snow's hypothesis as a viable explanation.

The sixteenth-century relationship between the Mohawk and their Mahican neighbors to the east bears more consideration than it has received in the past. The tribes were documented enemies during the seventeenth century and vied throughout much of that period for control of the Dutch fur trade at Fort Orange (Lenig 1977:77). But their relationship prior to European contact is not well understood. There is some archaeological evidence (Normanskill cherts at the Klock site) that indicates the Mohawk may have had access to the Hudson Valley. The ceramic traditions of the two regions are remarkably similar, also suggesting peaceful interaction (Brumbach 1975). But there is a marked absence of Hudson River fish species (sturgeon, white perch) on fifteenth- and sixteenth-century Mohawk sites (Kuhn and Funk 2000:33, 36–37, 54). Also, a study of ceramic pipes from the two regions produced no evidence of interaction, leading the junior author to conclude that the seventeenth-century conflict between the tribes may have had its origins in earlier times (Kuhn 1986). Much more consideration and archaeological analysis of the Mohawk's relationship to one of their closest neighbors is warranted in the future.

We take the highly defensive settlements of the sixteenth-century Mohawk to be a good indication that the formidable Five Nations Confederacy, Morgan's famed League of the Iroquois, had not yet been established. Recent research by the junior author leads us to conclude that this institution probably formed sometime between 1590 and 1610 (Kuhn and Sempowski 2001), which places it later than the occupations of the Garoga, Klock, and Smith-Pagerie sites, although the Smith-Pagerie occupation might possibly extend up to about 1590.

It is important to note that this date is intended only to provide a time frame for the *culmination* of the confederacy in its *Five Nations* (Mohawk, Oneida, Onondaga, Cayuga, Seneca) form. It seems highly likely that the eastern Iroquois (the Mohawk, Oneida, Onondaga) maintained a relationship, alliance, or even a confederacy of sorts that existed before the Five Nations Confederacy. These three tribes derive from a common population and cultural origin. They were located close in space and shared similarities in most aspects of their culture. An intertribal relationship marked by peace, cooperation, and shared rituals may have existed between these three tribes for a long time. Later, this relationship probably became the basis for the Five Nations Confederacy. Furthermore, many of the rituals associated with the League, particularly the condolence ceremonies, are undoubtedly of even greater antiquity.

In our opinion the time period of the mid-sixteenth century, during which the Garoga, Klock, and Smith-Pagerie sites were occupied, is of great interest regarding the understanding of warfare, intertribal politics, and the formation of the Five Nations Confederacy. Clearly it was a period of heightened intertribal conflict. Unless we miss our guess, it was also a time of increased intertribal diplomacy: the period in which the groundwork for the Five Nations Confederacy was being laid, and the period that immediately preceded the formation of that famous alliance. Searching for evidence of this process in the archaeological record of these sites will be an ongoing endeavor.

Among the Iroquois there was no separation of the secular and the sacred. Religious beliefs, ritual, and ceremony pervaded all aspects of life from the daily activities of the village to distant political negotiations among tribes. This must have been especially true during the sixteenth century, a period of heightened warfare, intertribal relations, and earliest European influence. Unfortunately ritual and ceremonial practices are rarely reflected in the archaeological record, in the absence of data from cemeteries. The great bulk of the artifacts from houses, features, and middens is related to domestic and subsistence activities. Objects of ornamental or decorative use including bone, shell, and stone beads, perforated deer phalangeal cones, perforated animal teeth, and so on, were rare on the Garoga, Klock, and Smith-Pagerie sites.

Clues to Mohawk iconography and symbology are to be found in the anthropomorphic figures and faces on smoking pipes and pottery vessels, on bone combs, and on pendants and maskettes of antler and clay. The small number of such objects makes it difficult to conduct meaningful studies of patterns, trends, or associations in these classes of artifacts. But we feel (after Ritchie and Funk 1973:367 and Tuck 1971:213) that the ceramic maskettes (Figure 59, No. 9) and faces carved on bone and antler objects (Figure 39, No. 11) must relate closely to the masking complex that was widespread in northeastern North America (Kausche 1986), and possibly to the rituals and beliefs associated with the False Face Societies of the Iroquois (Blau 1966; Fenton 1987). In contrast, human faces and effigies on pots probably relate to the mythological race of cornhusk people, embodying connotations of domesticity, femaleness, and corn (Wonderley 2002).

Although interpretations of Mohawk religious and ceremonial life most glaringly expose the significant limitations of the archaeological record, we would be the first to admit that the general knowledge gained from Mohawk archaeological pursuits is meager indeed. Archaeology can provide a time depth that is unavailable from any other source. It can build chronologies and paint sweeping patterns of life with a broad brush. It can provide a general context of cultural development with some level of acceptable accuracy. But the personal measure of a people's existence, the value and meaning of what they themselves considered important, and the human context of a culture, is perhaps forever lost to archaeology. Early documentary records of people who interacted with the Mohawk (Gehring and Starna 1988; Snow, Gehring, and Starna 1996), ethnographic accounts (Fenton and Moore 1974; Morgan 1901), and the Iroquois themselves (Cornplanter 1938; Elm and Antone 2000; Parker 1968) must be relied upon to infuse the archaeological record with the rich substance of Iroquois ideology, culture, tradition, and life.

FUTURE RESEARCH

Archaeological site reports and syntheses often present their results as an exhausted subject, as if all the questions have been answered and all the problems have been solved. This is certainly not the case with the Garoga, Klock, and Smith-Pagerie sites. The settlement pattern data from these sites is so rich and complex and the artifact assemblages so large and diverse that our efforts to study, analyze, and report on them represent little more than a mere beginning. We have no doubt that much more can be learned from the examination of these sites and encourage other archaeologists—professionals, students, and avocationals—to use these collections and records for future archaeological research. Here we note some important research topics worth pursuing that occurred to us while working with the materials from these sites.

Most obviously, additional feature analysis is warranted. Moeller (1992) has shown that the study of features can be an incomparable source of information on human behaviors related to cooking, heating, storage, discard, and other activities that take place at a site. The 249 features excavated at the three Caroga Creek sites represent a large sample that would be conducive to a detailed feature analysis. Many of these features were large, deeply stratified, artifact-rich pits that could yield information on feature construction, function, duration of use, secondary uses, relation to other features in a house, abandonment, and other attributes. Our efforts to provide basic information on the features from these sites (Tables 2, 13, 27), as well as locational associations between features and houses, should make it easier for future researchers to undertake these types of studies. The database is so large and the potential results so enlightening that a comprehensive study of the features at the Garoga, Klock, and Smith-Pagerie sites would make an appropriate dissertation topic for a highly motivated student.

It is not out of the question that such an analysis might even be able to define internal house occupancy and expansion sequences, temporal relationships between houses within a site, and an intrasite village construction chronology, when combined with an analysis of other settlement pattern data and spatial artifact patterning. At all three sites there were occasional examples of overlapping or intersecting postmold lines and/or hearth features on or near wall lines that could not be contemporaneous. Clearly the entire village construction at each site was not a single event, but rather a process of building over time. Perhaps this process could be unraveled using a combination of techniques like Warrick's (1988) model of longhouse duration based on wall-post densities; other measures of occupancy and duration based upon feature, pottery, debitage, or animal bone densities; feature microstratigraphy; intrasite microseriation using sensitive pottery attributes; and the spatial distribution within the site of other diagnostic artifacts.

We have yet to examine any spatial artifact patterning at Garoga, Klock, and Smith-Pagerie, although Brumbach's (1985) work with the latter site has already demonstrated that this is a promising avenue of research. In Canada, where the complete or nearly complete excavation of whole village sites is more common, the mapping of cross-mends and other spatial patterns of artifact distributions has also yielded interesting results (e.g., Von Gernet 1982; Warrick 1984:94–95, 117, 119). Cross-mends indicating connections between houses, connections between houses and activity areas, and connections between houses and middens can provide insights into internal village associations (Salisbury 2001). Spatial clusters of artifacts can be used to define functional areas of houses, or the nature of work areas outside of houses. Prezzano's (1992:330–372) thorough analysis of spatial artifact distributions at the Boland site is a good example of this type of work. The studies noted here suggest that most of the identifiable artifact patterning reflects refuse disposal practices. But the artifacts were recovered from middens and living floors at the sites under consideration. It would be interesting to see if the Garoga, Klock, and Smith-Pagerie sites, where most of the artifacts come from features, produced the same or different results. Brumbach's (1985) results suggest to us that since most of the refuse was deposited in pits within longhouses (presumably the same houses within which the artifacts were used, broken, and discarded), spatial analyses of artifacts at these sites may yield superior results that are less confounded by artifact movement related to refuse disposal. This type of spatial analysis could provide a much fuller understanding of intrasite community patterning and even reflect kin ties, marriage and residence practices, or lineage and clan configurations within the village.

Within-site artifact patterning can also have implications for external contacts and relations. We remain particularly interested in the occurrence of exotic pottery at these Caroga Creek sites (Kuhn, Funk, and Pendergast 1993), but have yet to undertake an analysis of the spatial distribution of these artifacts within the Mohawk villages. At the Huron Kirche site, located in the Trent Valley, St. Lawrence Iroquoian pottery was associated with a group of houses located outside the village palisade, suggesting "a relict Saint Lawrence Iroquoian population in the process of attaching itself to a host village" (Ramsden 1990b:93). It seems unlikely that this specific type of scenario occurred at the Garoga, Klock, or Smith-Pagerie sites, but it would be interesting to determine if exotic pottery clustered or was associated with specific longhouses at these sites.

Analyzing and understanding the village relocation sequence is a topic that deserves additional research. Our interpretation that the sequence was from Garoga to Klock to Smith-Pagerie is based primarily upon the seriation of these sites using temporally sensitive pottery attributes. We employed only 10 attributes. Our pottery database is large, and other single attributes, bivariate combinations of attributes, and multivariate analyses of attributes remain to be explored. In addition, our attribute database does not even include many traits that may be more reflective of individual potters. For example, Warrick (1984:106–110) has attempted to identify individual potters at a site based upon an analysis of line metrics (e.g., the spacing and angle of design elements). Intuitively, his assumption that such attributes may be equivalent to hand-writing metrics, reflecting indiosyncratic motor habits of individual potters, seems reasonable to us. We also suggest that there may be many other pottery attributes that could reflect the manufacturing and decorative practices of individual potters. At sites such as Garoga, Klock, and Smith-Pagerie, it may even be possible to identify the pottery of potters that lived and worked in more than one village over the course of their lifetime. This type of identification, if successful, could serve as an independent verification or rejection of the village relocation sequence we have postulated based upon broader temporal trends in ceramics. But such a study has yet to be conducted.

Another intriguing possibility, however unlikely, is that the presence of an individual potter in more than one village could be recorded in fingerprints. At all three Caroga Creek sites rare examples of fingerprints preserved in fired pottery have been identified. Most often these occurred on juvenile potsherds. The better pottery almost always was carefully wiped before firing, which would remove any prints, but juvenile potsherds rarely display wiping and fingerprints are occasionally preserved. Fingerprints and even teeth marks have been noted on ceramics from other Iroquoian sites as well (Plourde 1993:105; Williamson 1985). The likelihood of finding fingerprint matches seems particularly remote, but such a discovery would be so unusual and intriguing that it is worth pursuing. Even if matches cannot be found, analysis of fingerprints could address other questions, such as: Were children actually responsible for the sherds that we classify as juvenile? Did females make the pottery and males make the clay pipes, as commonly assumed? Does the location and orientation of the print on the sherd provide any insights regarding the motor habits used in pottery construction?

An important research pursuit more certain to yield productive results would be a site catchment analysis of the Garoga, Klock, and Smith-Pagerie sites. Such an analysis could be used to test some of the general assumptions we have made for the Caroga Creek village relocation sequence. Numerous studies have shown the value of considering Iroquoian village locations within the context of their immediate environmental setting, including the productivity of surrounding soils, distance to critical resources such as lithic sources, firewood, building materials, and game (Bond 1985; Heidenreich 1971; Perrelli 2001; Starna, Hamell, and Butts 1984; Sykes 1980). In addition to providing insights into village relocation strategies, site catchment analysis could generate a more comprehensive understanding of Mohawk land use patterns, resource exploitation patterns, environmental constraints, and the possible long-term impacts of Iroquoian occupation on the ecosystem. A major study of this type would also make an excellent thesis or dissertation.

Reconstructing relocation sequences, or village lineages, for the three major Mohawk villages located in the middle Mohawk Valley is a task that has yet to be satisfactorily worked out, although a number of constructive efforts have been made (Bamann 1993; D. Lenig 1977:71–73; W. Lenig 1998; Rumrill 1985; Snow 1995). For the Onondaga, Tuck (1971:208–218) identified a host of microtraditions—including presence/absence of chipped-stone discs, pottery neck decoration, pottery surface treatment, and even longhouse dimensions—that allowed him to reconstruct community movements from site to site. Although Bradley's (1987:37) reevaluation of this data suggests that the specific site pairings and movements proposed by Tuck are largely conjectural, we do not dismiss the notion that it may be possible to identify specific artifact or settlement pattern traits that could be used to help unravel the larger patterns of Mohawk community movements. That said, the junior author's in-depth work with Mohawk archaeological collections, including and beyond the three Caroga Creek sites, has yet to discover or identify any such traits. However, our efforts in this direction cannot be considered exhaustive, and further investigations are clearly warranted. Snow (1995:44) may be correct that the real-life dynamics of Iroquoian communities are far too fluid and complex to sort out archaeologically. Or it may be that the archaeological record for the Mohawk is simply too compromised and incomplete to be able to recognize the types of microtraditions we are looking for. Nevertheless, research in this direction should continue and may someday prove to be more productive.

With regard to the limitations of the Mohawk archaeological record, we remain strong advocates for additional field investigations in the Mohawk Valley. The programs mounted by the New York State Museum and the University at Albany were major multiyear undertakings that included testing and excavations at numerous sites. In addition to these field programs, excavations on Mohawk sites have been conducted by the Van Epps–Hartley Chapter of the New York State Archaeological Association and others. Snow's (1995) opus is a testament to the enduring volume of archaeology that has been conducted in the Mohawk Valley. Nevertheless, there remain large gaps in the archaeological record for the Mohawk, and there is much more to be done at both the survey and site-specific levels. It is our hope that this volume will not only stimulate interest in the New York State Museum's work at the Garoga, Klock, and Smith-Pagerie sites, but also rekindle interest in active fieldwork dedicated to learning about and appreciating the rich past of the Mohawk people.

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